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A Forward View

EVEN the most casual observer of current events must note that economy is the watchword with regard to the conduct of federal business. It is a fairly safe prediction that future personnel ceilings will be even more limiting than present ones.

Accounting and auditing in the federal government is in a transitory stage. Legislation in recent years has recognized the importance of modern accounting and auditing concepts and has provided for their introduction to the affairs of state. Thus, federal accountants in general are facing their most challenging tasks at a time when, for fiscal reasons, their numbers are being reduced or, at the very best, held constant. This difficult problem must be solved internally by the accountants themselves. Two avenues of approach are suggested.

First, top management at the departmental level must be convinced that accounting and auditing provide the means to identify and eliminate areas of inefficiency, waste, and the unjustified dissipation of resources. In that way, accounting and auditing functions can become a part of the "hard core" to be left undisturbed by fiscal considerations. This conviction upon the part of top management will be obtained only through demonstrated performance. Accounting controls must be improved and translated into bases for effective management action. Improved internal auditing must become management's eyes and ears in the field and prove its worth through objective and constructive reporting.

Second, we, as federal accountants, must recognize that we are not immune to creeping paralysis. We must be prepared to introduce efficiencies to our own operations through the constant de-

velopment of new and improved accounting and auditing techniques—techniques which will not only provide a better standard of quality but which will be less time consuming than those of the present. One area for attention will certainly lie in improving the technology we employ. Another should be in the search for better organizational formats; still another in the broadening of our mission and in better defining our objectives. Finally, and it is hoped that *The Federal Accountant* will play its part, there must be an improvement in communications between federal accountants and auditors at the management level to assure a fruitful exchange of ideas developed in the discharge of our responsibilities.

H. A. WALLACE

First Vice-President
Federal Government Accountants Association

Percy Rappaport

Improvement of Financial Management in the Government

The second Hoover Commission report proposed action toward strengthening the management function of accounting in government. The Bureau of the Budget was the most directly concerned of the central financial agencies in such action, and it now conducts programs toward integration and modernization of budget and accounting operations in agencies in order to improve financial management. Significant among recent changes resulting from the Hoover Commission recommendations were those provided in Public Law 863, passed in 1956, with regard to the development of financial information on the accrual basis and the use of cost-based budgets. With the above and other changes, it is hoped that the government can soon have in effect a modern system of managerial controls for effective financial administration.

Mr. Rappaport is assistant director of the Bureau of the Budget.

THE improvement of financial management in government is of significance and importance to us all. Those who are employed in the federal government are directly interested in the subject. Those who have no connection with government operations should have knowledge of the financial management practices and problems we deal with in the government.

SIGNIFICANCE OF THE BUDGET

Among my first impressions of the role of accounting in government was a recognition of the overwhelming importance of the budget function. This function involves a very elaborate system, based on many laws and regulations which tend to control the accounting procedures and the entire financial process. In industry, budgeting generally is an informal process, with primary emphasis placed on accounting for, and reporting the results of, company operations. Budgets in government, I have found, start at the lower levels of the operating bureaus. They wend their way through several levels of organization, resulting in a formal presentation of requirements to top management. Then they are processed through the Bureau of the Budget and finally through the two houses of Congress.

In industry, budgets are relatively flexible and are directed toward producing favorable profit results. The government problem is vastly different. Operating funds are obtained through appropriations by the Congress, and such funds are secured without the benefit of the profit element. Once approved, the federal budget has limitations which must be observed under the penalty of law. In this setting, emphasis has been placed on operating within the monetary limits established by the Congress. Accounting in government has therefore been used primarily for showing adherence to legal requirements rather than as a tool for effective management of programs.

The second Hoover Commission, made up of business and professional people, recognized that inadequate attention had been given to accounting. Its Budget and Accounting Report highlighted the need for further development of the accounting function. It pointed out that a start had been made toward this goal in recent years, but suggested that this improvement be speeded up.

It is a major job to recommend any change in over-all procedure to a client. The human tendency is to resist change, and any over-all revision requires a process of re-education. In government, an attempt to change the direction of a basic function like accounting is a task of such magnitude that the effects are beyond clear comprehension. Laws and regulations have to be revamped, and this requires congressional and many topside approvals. In

turn, numerous changes in responsibilities and procedures are required and such changes disturb a way of life in a multitude of locations. In short, comparing a systems change in industry with one in the federal government is like the comparison of a local revolutionary action with a world war.

BACKGROUND

Present-day management of financial operations in government is the result of an evolutionary process that began with the establishment of simple cash controls to prevent the overexpenditure of public funds. This evolution started with the recognition of commitments or obligations in the accounts—which were later budgeted and controlled in terms of a uniform grouping by kinds of purchases. Eventually, this uniform classification by "objects of expenditure" was supplemented by a schedule of financial information showing the kinds of programs and activities being carried on. Beginning with the budget for the fiscal year 1951, this "activity schedule" became the primary classification for the management of financial operations. In the subsequent development and refinement of this program and activity concept, a gradual conversion to the cost basis of budgeting and accounting was initiated. But the system in most agencies today still concentrates on the traditional obligation and cash-disbursement basis.

The expansion and growth of federal activities in the last half century has been a primary factor in this evolutionary process. The increasing complexity of agency operations has constantly posed problems of fund control and program management. These problems have required answers for effective operation, leading to the current improvement of government-wide practices along lines similar to those employed for financial management purposes in private industry.

It was at this point that the second Hoover Commission made its study that resulted in the submission of a Budget and Accounting Report to the Congress in June 1955. This report proposed action toward strengthening the functions of the Bureau of the Budget; building up the fiscal management facilities of the agencies; using comprehensively the accrual and cost basis in government; and achieving related budget and accounting simplifications. In pre-

senting these recommendations, it stressed the need for more rapid progress in the improvements already under way. The Bureau of the Budget, among the central financial agencies in government, was most directly concerned by these recommendations.

Role of the Bureau of the Budget

The Budget and Accounting Act of 1921 made the President, as head of the executive branch, responsible for the development and presentation of a unified budget for the government as a whole. To provide the President with the staff assistance needed to carry out this responsibility, this act created the Bureau of the Budget in the Treasury Department. It also established the General Accounting Office as an independent agency in the legislative branch, with specified responsibilities for accounting and auditing.

Subsequent to this 1921 legislation, a reorganization plan in July 1939 transferred the Bureau of the Budget to the Executive Office of the President, and the Budget and Accounting Procedures Act of 1950 was enacted. The act of 1950 more clearly set forth the respective financial management responsibilities of the Bureau of the Budget, the Treasury Department, and the General Accounting Office; and in recognition of their related functions, it provided that these three agencies should conduct a continuous program for the improvement of accounting and financial reporting.

In the Executive Office of the President, the Bureau of the Budget serves as a staff arm of the President in developing the budget and bringing about more efficient and economical conduct of operations in the executive branch. The development of the annual budget for the government is a major job. This includes a detailed and searching review of agency fund requests as a basis for assembling a sound financial program. When finally issued, the budget not only contains the financial plan for the coming fiscal year, as approved by the President, but also presents background financial data for the current and preceding fiscal years. In addition, it contains a statement of policies in the President's Budget Message, and it gives details on the nature of the programs planned for the budget year and presents the related authorizing legislation.

The managerial function of the Bureau is of commensurate importance. While the agencies are responsible for carrying out the programs approved by the Congress, the Bureau follows through for the President by reviewing agency execution of the budget so as to ensure appropriate co-ordination. This is accomplished through the analysis of financial and other reports of agency activities and through on-the-site reviews of agency operations. In this process, the Bureau gives attention to the relative efficiency and effectiveness of agency operations against the background of accepted management principles. Besides the operating divisions that deal with the budgets and operations of individual agencies, the Bureau has five staff offices which provide government-wide co-ordination and assistance in several management areas. These areas include: legislation and executive orders, the budget process, organization and general management practices, financial management activities, and statistical programs.

IMPROVEMENT OF FINANCIAL MANAGEMENT

Leadership for the improvement of financial management in the executive branch is vested in the Bureau's staff Office of Accounting. This office conducts programs directed toward the integration and modernization of the budget and accounting operations in the agencies. These activities are performed in co-operation with the General Accounting Office, the Treasury Department, and executive agencies under the Joint Program for Improvement of Accounting. The latter is a co-ordinating mechanism that brings together the agencies assigned specific financial management responsibilities in basic legislation, so that effective progress may be made toward the mutual objective of improved financial management for the government as a whole.

Role of the Joint Accounting Program

While the Budget and Accounting Procedures Act of 1950 provides legal authority for the Joint Program for Improvement of Accounting, this co-operative effort actually began on an organized basis in 1948. At that time, the activities of the government had expanded and grown increasingly complex as a result of World War II, and the management structure was gradually changing

over to a decentralized basis of operation. The accounting processes were not keeping pace with these changes, and action was needed to make agency accounting systems more responsive to the needs of management. Since the joint program was initiated, there have been significant results in developing accounting and financial reporting to satisfy these demands. The Eighth Annual Progress Report issued under this joint program in January provides illustrations and examples of the most recent improvements installed by the many agencies in government.

Bureau Participation in the Joint Program

With the inception of this joint effort in 1948, the Bureau's part in the program was carried out by a small Accounting Group in the Bureau's Office of Management and Organization. The efforts of this group were directed primarily toward the co-ordination of the Bureau's budget and management activities with the development of accounting under the joint program. This has now been changed—on the basis of the recommendations of the second Hoover Commission. The Accounting Group was placed under my immediate direction and supervision early last year and has since become the Office of Accounting. Additional staff members have been taken on by this office under a supplemental appropriation provided by the Congress to strengthen the functions of the Bureau.

This action was taken to give increased stature to the accounting-improvement responsibilities of the executive branch. The Office of Accounting continues to work within the framework of the Joint Accounting Program; but, with the additional staff available, it can participate in more joint projects and work more directly with the operating agencies. This enables the Bureau to provide more effective leadership for the executive branch in the further development of financial management practices in the government.

Recent Legislative Action

The Budget and Accounting Report of the second Hoover Commission made an important contribution to the continued development of financial management in government. It was endorsed by the President in a public statement issued in April 1956,

in which he urged the Congress to enact needed legislation and directed the agencies to take prompt action.

The last Congress passed two laws that served to complement the administration's plans for implementation of this report. Public Law 798, enacted last July, permits agencies to pay their own claims unless the transactions involve questions of law or fact which require interpretation by the General Accounting Office. These "claims" represent bills that are chargeable to appropriated funds no longer available to the agency. Under previous practice, such bills could be paid only on certification by the General Accounting Office, out of a central account in the Treasury Department that accumulated all lapsed agency funds. The main improvement in this change is the elimination of the duplicate review of such claims in the General Accounting Office. This improvement is expected eventually to produce annual savings of about $600,000 in this operation in the General Accounting Office alone.

The other new law, Public Law 863, was passed about the same time. Among its most significant provisions are those for use of cost data in governmental budgeting and accounting. These provisions will have an important bearing on improving the control and effective use of government funds. In addition, Public Law 863 provides for showing the cost of performance and accomplishments in the executive budget, for developing consistent budget and accounting classifications that reflect the agency's organization, and for simplifying the financing structure the agency uses to control the commitment of appropriated funds.

Accrued Expenditure Appropriation Proposal

One of the major Hoover Commission recommendations that failed of enactment in the last Congress was the proposal that appropriations be made in terms of annual accrued expenditures. Under existing practice, congressional appropriations give agencies authority to order goods and services. In contrast, the commission's recommendation provides that the Congress would appropriate funds to cover expenditures for goods and services to be received in the budget year. With such appropriations, agencies would also need contract authority to enable them to place orders for the delivery of goods required in subsequent years. This change in the method of appropriating would have a number of

advantages over existing practices. It would bring about better programming and planning in the agencies; it would provide a better basis in both the executive branch and the Congress for analyzing budget requirements; and it would focus attention on, and require a systematic annual review of, the work to be performed in the budget year and the estimated cost of that work. Subsequently, the actual costs could be compared with the costs previously estimated and the Congress would be provided with a better means for controlling the outcome of the budget in terms of surplus or deficit. Legislation for this change was originally part of the bill finally enacted as Public Law 863. With executive branch support, this passed the Senate, but the accrued expenditure appropriation provision was deleted in the House.

This is a controversial proposal. Questions about the feasibility of this procedure have cited the possibilities that the agencies may not be able to estimate accurately their expenditure requirements; that this may cause more supplemental appropriations; or that this might result in maintenance of two sets of accounting records. Admittedly, there would be some operational problems that would have to be worked out. However, the proposal provides for flexibility in converting to the new basis. It provides that the changeover shall be accomplished in such manner and at such times as may be determined by the President. Under these provisions the conversion would be made gradually, taking one or two appropriations in the first year on a pilot basis. In this way, any problems which might arise could be worked out in a practical manner.

The President recommended further consideration of legislation for this purpose in his 1958 Budget Message. Such legislation has been introduced in both houses of the 85th Congress. As in the last Congress, the administration supported these bills in hearings before the respective congressional committees.

Accrual Accounting and Cost Budgeting

To get back to the subject of enacted legislation, agencies are now responsible under Public Law 863 for developing financial information on the accrual basis and for using cost-based budgets. In the installation of such systems, progress has been made in a number of agencies. The 1958 budget included 120 business-type presentations and 46 cost-based appropriation requests—which

are based on the use of accrual accounting. Most agencies, however, still use the traditional budget and accounting system which concentrates on fund requirements and obligation control. This traditional system fails to give adequate attention to agency liabilities, the dollar value of physical assets, operating inventories, and operation costs. It usually provides data only on obligations, which reflect the commitment of funds, and disbursements, which represent the payment of funds.

In accordance with the new law, accrual accounting systems will be developed in the agencies on the basis of the principles and standards issued by the General Accounting Office. Using these criteria, an accrual accounting system in a government agency develops information as needed on the costs of goods and services used, on accrued expenditures which show goods and services received, on disbursements that represent payments made, and on obligations that reflect orders placed. It incorporates financial controls that are consistent with management responsibilities—generally providing for broad fund controls in terms of limitations on obligations at a fairly high level of agency operations and for more detailed controls in terms of specific costs attributable to the agency programs. In contrast to traditional accounting practice in government, an accrual system thus not only reflects the availability of funds, but also shows the resources on hand and the actual use of such available resources.

With these additional data, a cost-based budget can be prepared which relates accomplishments and future work plans to costs in terms that are significant for the kind of program financed by the appropriation. Such a budget would identify the inventories on hand and available for use, the goods and services ordered but not yet received, and the obligations required to finance the program. Briefly stated, it presents the total financial plan of operation, as opposed to the mere presentation of the financing needed for the program. As such, a cost-based budget is most beneficial in programs involving large inventories and long lead-time items, because it identifies carry-overs of available resources. It also allows for better evaluation of such programs, because it identifies the use of resources in relation to the time period involved.

The degree to which accrual accounting and cost-based budget-

ing will be applied in individual agencies will vary with the kinds of operations conducted by the agency and with the needs of management for accrual or cost information. Basically, under Public Law 863, all agency systems should produce, at appropriate time intervals, information on accrued expenditures. For full disclosure, these data should be reflected in the agency budget presentation. Depending on the type of program conducted by the agency, there may be a need for further budget and management information on the cost of goods and services used, the cost of items procured or produced, or the cost of work in place. Accordingly, accounting and budgeting on a cost basis will be applied in each case to the degree that the additional information obtained will be more useful to agency management and will provide for better disclosure of financial status and operational results to the various levels of management in government. The Bureau of the Budget plans to use cost-based presentations in future budget documents to the fullest extent practicable, and it is placing immediate emphasis on those appropriations in which the conversion will produce major benefits for purposes of review and analysis.

Related Objectives

Accounting and budgeting on a cost basis are but two of the major objectives of Public Law 863. Others of similar significance are concerned with the agencies' allotment structures and with the classifications used by the agencies for budgeting, accounting, and control.

The new law requires a simplification of the accounting structure employed by the agency to control the use of available funds. The past concentration on obligation accounting has in many cases led to the establishment of a multiplicity of obligation allotment accounts in an attempt to meet the operating needs of management. The current effort will emphasize the use of obligation accounts at the highest practical level, to serve only the primary purpose of fund control. These control accounts will be supplemented by appropriate detailed cost classifications developed to provide the necessary management information.

Public Law 863 requires that budget and accounting classifications be consistent and synchronized with the agency organization

structure to the greatest extent possible. This requirement reflects the desirable objective of using common classifications for programming, budgeting, accounting, and reporting. The evolution of financial management in the federal government has produced a complex of budget and accounting classifications that have not always been consistent with each other, or with the manner in which the agency conducted its operations. While corrective action has been taken from time to time, this requirement in the new law places emphasis on a re-evaluation of present practices as part of the development of a cost-based budget and accounting system, to ensure the establishment of these classifications in appropriate relationship.

Program for Agency Improvement Action

With the enactment of the new financial management legislation, the Bureau of the Budget issued a bulletin last October to initiate an organized government-wide program for applying the legislative provisions and attaining the objectives of those Hoover Commission recommendations not covered by law. Included with this bulletin was a pamphlet, *Improvement of Financial Management in the Federal Government,* which provides policies and guidelines for the installation of the desired practices and procedures.

Under this program, each agency was required to prepare a scheduled plan of action and to submit this plan to the Bureau for review. These improvements are basically a responsibility of the individual agency and are to be installed by the agency as rapidly as possible. The central agencies under the Joint Accounting Program are reviewing the agency submissions and are providing such assistance as they can to bring the plans to an early and successful conclusion.

As part of the total improvement effort in this field, the Bureau, together with the General Accounting Office and the Treasury Department, has recently taken steps to tighten up the working arrangements under the Joint Accounting Program. A steering committee has been established which consists of a representative of each of these agencies, and it meets weekly to initiate joint projects in civilian agencies and to keep abreast of the progress made in projects under way. A similar steering committee has been

set up for the Department of Defense. Through these working arrangements, several civilian agencies and the Department of Defense are being given assistance on improvement of accounting systems. In addition, projects have been set up which involve studies of such subjects as central financial reporting requirements, disbursing arrangements, overhead costs on government-sponsored research work, and the handling of undeliverable checks.

CONCLUSION

In the final analysis, the degree of success that is attained in this effort toward improvement of financial management depends upon the individual agencies. Each of the operating agencies is expected: (a) to develop an improvement program which reflects an application of the established policies appropriate to its needs; (b) to provide for assignment of the staff necessary to do the job; and (c) to carry out the program as rapidly as possible.

The financial management staffs in the operating agencies have an important role to play in this effort. Theirs is the job of obtaining a clear understanding of the objectives and applying that understanding in the resolution of problems that arise in the refinement and conversion of agency budget and accounting systems. Similarly, the Bureau of the Budget and the other central agencies also have an important role—one of clearly setting forth the policies and instructions to be followed, assisting and co-ordinating agency efforts to produce consistent results on a government-wide basis, and stimulating rapid progress toward the established objectives. All told, the job ahead requires that everyone concerned apply initiative and understanding to this undertaking, so that the federal government can soon enjoy the benefits that can be derived from modern and effective financial administration.

Major General W. P. Farnsworth

L. N. Teitelbaum

Can Auditors Use Statistical Sampling Methods?

Statistical sampling techniques, which are widely used in the sciences and professions, can also be useful to the auditor by providing him with factual and objective information. The advantages of several sampling methods as well as the indications of their potential usefulness, particularly in government auditing, appeared in a program of tests of selected audit areas conducted by the Auditor General, Air Force. It has also become increasingly evident that for the accounting-auditing field, "acceptance sampling" may not be wholly appropriate and that "survey sampling" may be more promising and practical.

General Farnsworth is auditor general, U.S. Air Force, and Mr. Teitelbaum is chief of the Plans and Program Division, Auditor General, U. S. Air Force.

STATISTICAL sampling is no longer an academic subject. It is being used extensively and effectively in all of the sciences and many professions. Accountants and auditors also are beginning to use the techniques of scientific sampling. Although no panacea or magic formula which will solve all audit problems, and certainly no substitute for sound judgment, statistical rules actually coincide with and support auditors' basic audit principles and self-imposed criteria for test checking (sampling).

Auditors using these techniques have already demonstrated that statistical sampling is a powerful tool which, if used properly, enables them to do a better job. These techniques give more *objective* and *factual* information on which to base audit conclusions. Auditors cannot ignore these techniques if they are to keep up with current developments in the profession.

It has long been recognized that the size, complexity, and volume of data generated both in government operations and by government contractors precludes in most cases a 100 per cent inspection and audit of the records and supporting documents. It has therefore been accepted practice in public and commercial auditing, and in government auditing, to employ sampling or testing techniques to evaluate and to measure the reliability of the internal accounting controls and procedures and the accuracy of the records and documents.

Auditors, who necessarily deal with quantitative data when they audit large volumes of transactions, are frequently faced with difficult decisions involving the selection of a sample and the determination of its size. Since they obviously must work largely with such quantitative data, it seems logical that they should draw on and adapt statistical concepts and techniques and use them as effective tools in auditing practice.

Each audit, however, is usually different from any other, and the experience and judgment of auditors vary considerably. Decisions made in selecting samples are at the present time largely subjective and may be expected to differ widely unless based on objective criteria. In order to overcome this problem of subjective decisions, the accounting profession in the last three or four years has begun to experiment with the application of statistical methods to accounting and auditing activities. Statistical sampling has already been used successfully by public and commercial accountants in several different areas that involve large numbers of transactions. That interest in this tool is increasing is indicated by the growing volume of articles and books being published on the subject.

The auditor general of the U.S. Air Force also has recognized that here is a methodology which, potentially, has a broad field for development and application, particularly in government auditing, and which could become an important and effective device in

professional audit practice. The Auditor General organization, therefore, is currently experimenting and testing the application of statistical methods to its audit activities. Experience so far indicates that a number of advantages should accrue if this tool is properly used.

1) The auditor will be able to select samples objectively, rather than empirically or intuitively, and thereby he will be in a position to calculate the extent of the risk he is incurring on a particular test check.

2) He will be able to support his opinion concerning the condition of the particular group of transactions being checked, and, within proper limitations, he should be able to estimate scientifically the percentage of error in the total volume of transactions (or "universe") under audit.

3) By using statistical disciplines the auditor may find that he has not been selecting adequate or representative samples and may be arriving at erroneous or unreliable audit findings and recommendations.

4) The auditor may find that his present samples are larger than required, that he could select smaller samples and still obtain acceptable results. This would reduce his work.

5) Standard sampling procedures applied to similar audit activities at numerous Air Force installations would provide uniform data for estimating operating efficiency and costs, and for comparison and consolidation in summary audit reports for use by higher levels of management.

6) Uniform sampling methods also would simplify the work of supervisory auditors when they review audit operations in the field. They would not be forced to check, in as great detail, the adequacy of the samples selected or the way they were selected.

7) Such techniques may be applied in related accounting and financial areas. In fact, the Air Force Finance Center published a statistical sampling plan in September 1956 designed to test and control the quality of military payroll records in each finance office.

It is apparent that the theoretical possibilities for the use of these techniques are numerous. Many sciences, professions, and business organizations which must deal with quantitative data have

used statistical sampling methods with significant success. One of the outstanding examples is the application of statistical sampling techniques in controlling the quality of manufactured products at a minimum cost for inspection and testing. In fact, quality control techniques have been so effective that their wholesale application to auditing areas has been advocated, and some attempts have been made to apply quality control procedures without change to audit situations.

STATISTICAL SAMPLING METHODS IN AUDIT AND QUALITY CONTROL COMPARED

In general, it is true that the problems in auditing and quality control of matériel are basically similar. There are two reasons for this: First, auditing is a form of inspection of financial records to determine their validity and accuracy, whereas quality control is a form of inspection of matériel (equipment and supplies) to determine conformance to specifications and established quality standards. Secondly, in auditing, as in quality control, it is not desirable or practical to inspect each and every item. Therefore, sampling methods are as inherent in auditing as in quality control or in any operation involving large numbers of items.

The current development and widespread use of statistical quality control procedures resulted from a systematic study, testing, and adaptation of statistical methods to the problem of maintaining required levels of quality in manufacturing processes without the necessity of 100 per cent inspection. In essence, the requirements in auditing are similar, since auditors also must determine the characteristics of a given universe on a minimum sampling basis.

Many auditors are familiar with the classic statistical example of the 10,000 black and white balls mixed in some unknown proportion in a bowl. One wants to find out the proportion of black balls to white balls by a sampling process. One ball is drawn at random, its color recorded, the ball replaced, the contents stirred, and the process repeated until 100 balls are drawn. Assuming that ten of the balls drawn are black and ninety are white, it may be inferred that ten per cent of the balls in the bowl are black. Since the sample is rather small, 100 out of 10,000 (or 1 per cent), one may question the validity of the estimate. Here, the statistician tells us that,

based on the laws of probability, two important attributes of the sample can be determined: first, by what percentage the actual number of black balls in the bowl could vary over and under our sample, that is, the probable range of black balls in the bowl; and, secondly, to what degree or percentage the sample accurately represents the distribution of balls in the bowl.

In theory, at least, the auditor should be able to substitute 10,000 invoices or 10,000 receiving reports or any mass of similar documents for the 10,000 balls in the bowl and apply the same underlying statistical concepts. How good is this idea when applied to auditing areas?

It should be obvious that the basic laws of probability underlying the sampling estimates taken from the bowl of black and white balls are the same for audit as they are for quality control. But there are differences, and they lie in the practical application of the basic concepts to each of these two distinct fields.

Statistical quality control methods for manufactured products have generally involved "acceptance sampling," which is a specialized use of statistical analysis and the laws of probability for the inspection of manufactured products. Statistical tables and charts have been prepared to facilitate the application of these "acceptance sampling" techniques.

As testing in the accounting-auditing field increases, it is becoming more and more evident that "acceptance sampling" as developed and specially adapted to quality control requirements is not appropriate for many audit areas and should not be carried over mechanically. There are a number of reasons for this.

First, the present state of development of the accounting profession is considerably less objective and requires a good deal more individual judgment in evaluation of findings than quality control activities permit. Auditors deal primarily with financial data and are concerned with the dollar error in the accounts as well as with the number and type of transactions in error. Various tests and applications made during the last three or four years indicate that statistical quality techniques which are based on "acceptance sampling" procedures are not generally suitable for *estimating* the *magnitude* of error in the population stated in dollars or the *magnitude* of error by type or kind. Nor can they be used to evaluate

reasons for deficiencies or noncompliance with rules, regulations, and procedures.

Secondly, the basic concept in quality control methods of "accept" or "reject" has little meaning for audit purposes. All acceptance sampling schemes provide a predetermined "acceptance" or "rejection" rule which controls the actions of the inspector. No such predetermined rule can be used in most audit tests at this time. If a "reject" decision is made, it would ordinarily mean a 100 per cent audit. This is neither physically nor economically possible in the majority of audit situations. The auditor can neither "accept" nor "reject" a batch of invoices which have been processed and paid. Instead, his job is to determine the over-all reliability of the accounting system and the general accuracy of the accounting records.

Thirdly, the characteristics of accounting data are much more difficult to define and evaluate than the color of balls or the quality levels of industrial products. For example, in a recent survey some twenty-two types of errors of omission or commission in a particular Air Force accounting area were listed as affecting the records. The two questions: "What type of error is significant?" and "What is the relative importance of each type of error?" are always difficult ones to answer.

Fourthly, in quality control only one characteristic is usually tested at any one time. The auditor, on the other hand, normally must make as many tests as possible as he proceeds to review the data and may find many types of errors of varying degrees of significance. Since he cannot use a predetermined "acceptance" or "rejection" rule, the auditor has to make his decision as to the condition of the records in relation to tests of the system as a *whole,* rather than on specific tests limited to the particular groups of documents. In other words, auditing requires decisions by judgment and experience rather than by fixed rule.

Recent studies both in private business and in government operations point to the use of a different statistical method. This method, which is called "survey sampling," uses *general* sampling theory and techniques as a more promising and practical approach to evaluation of audit areas than the specialized "acceptance sampling" techniques. This approach does not require a predeter-

mined decision rule (i.e., the "accept" or "reject" rule) based on specified sizes of samples. Instead, the auditor forms his opinion of the whole group of items under audit *after* the sample is drawn and examined. The sample size is determined by three basic factors: past experience indicating the accuracy of the records and documents in the universe (or a reasonable estimate of the same), the desired accuracy, and the risk that the sample does not truly represent the universe. The selection of appropriate limits of accuracy and risk are made only after careful consideration of the nature of the specific area to be audited, costs involved, legal requirements, and the limitations of personnel, time, and administrative requirements.

The survey sampling method permits the auditor to estimate the value of one or more characteristics of the larger group. He can also measure the *accuracy* of his sample as well as the *risk* that the estimate may be wrong. In addition, he can relate the characteristics revealed by the sample to his over-all review and knowledge of the accounting system and internal controls *before* he forms a final opinion as to the reliability and accuracy of the records.

The opinions expressed above are not intended, however, to foreclose the use of "acceptance sampling" techniques by auditors in specific audit areas where they are appropriate and can be properly applied. The experimental evidence which has been accumulated to date, however, indicates that further careful study and testing of "acceptance sampling" techniques and the establishment of more objective audit standards are necessary before they can be applied more extensively in auditing activities.

AN EXPERIMENTAL APPLICATION OF STATISTICAL SAMPLING TO AUDITING

During the past year, the Auditor General has tested several statistical sampling applications in selected audit areas. As an example of the general approach, one of these tests is described below.

Supply activities at Air Force installations involve literally millions of transactions annually. For example, at one typical supply center 1,300,000 vouchers, which comprise a record of receipts, issues, adjustments, intra-account transfers, and related

operations, are processed each year. About one-half the audit effort devoted annually to supply operations is consumed in testing the accuracy and reliability of these millions of transactions. Thus, the examination of transactions represents an area of great audit significance. Additional reasons for choosing this area were that the files of transactions documents at installations can be readily controlled and that the types of errors found in these documents, with which the auditor is concerned, can be readily and clearly defined.

It was generally agreed that the purposes of the tests of supply transactions were: (a) to determine the extent to which regulations are being followed; (b) to point out those areas where the controls are weak or are not being followed; (c) to recommend improvements or changes in the system of internal control.

Given these purposes of audit, it was possible to decide upon which of several basic sampling methods would best meet those goals. For purposes of this test, it was agreed that dollar estimates of the results of errors were not necessary. The objective was to determine the extent of the various kinds of errors in percentage terms. Therefore, after defining the possible errors, the actual test was concerned with determining whether the particular operation had been performed correctly or incorrectly. A sampling plan was devised to meet these requirements for audit of supply transactions.

One of the essential problems that were being considered in the test of transactions was the determination of proper sample sizes to be used in testing the adequacy of the internal control system which controls the processing of supply transactions. Such transactions include receipts from vendors, receipts from and issues to Air Force installations and other governmental agencies, inventory adjustments, changes and corrections, and so forth.

The testing program was designed to measure the feasibility and usefulness of statistical sampling techniques under normal field audit conditions, using regularly assigned Air Force audit personnel. In order to satisfy all purposes of the project, particularly those involving personnel training, the direction and supervision given to the field staff was kept to a minimum.

In order to get as broad a coverage of Air Force audit problems as possible and still remain within the limitations of time and personnel available, the field tests were conducted at four installa-

tions. These installations were two normal operating Air Force bases, one Air Force supply depot, and one Air Force air matériel area. Once the four installations had been designated, the participating field personnel were asked to outline the internal control system of the supply activity at their respective bases and to determine the annual volume of transactions processed. This information was used as a basis for designing the sampling plan.

A conference was arranged to acquaint the field and supervisory staff with the philosophy and principles of statistical sampling and with the purposes of the test. At the same time, on the basis of the data previously submitted, the sample sizes and sampling methods to be used at each test site were determined.

The conferees jointly decided on definitions of errors to be used in the field tests, as well as uniform procedures which should be followed in carrying out the tests. These procedures were quite simple and can be summarized as follows:

1) The several types of documents or vouchers which regularly flowed through the supply activity were reviewed. The kinds of errors which could occur were designated by form number (that is, by type of voucher) and by responsibility within the supply activity.

2) In the absence of previous statistical data, sample sizes were estimated and drawn from the most recent six-month period.

3) Based on the existing filing procedures, an appropriate two-stage sample selection procedure was established. The first stage called for the "random" selection (using statistical rules) of a number of folders of one hundred vouchers each from the central files. The second stage then specified a "random" start followed by a systematic selection of ten documents from each of the previously selected folders of one hundred vouchers.

4) Appropriate working papers for recording the examination results were designed and prepared. These were uniform working papers and were used at all test installations.

5) Normal audit steps were applied to each voucher in the sample in checking out each error possibility.

6) The final results were evaluated using statistical estimation procedures to determine the accuracy and reliability of the sample results pertaining to types of documents and categories of errors.

7) Using the above statistical estimates of error rates, the audi-

tors at the test sites were instructed how to interpret the results in terms of specific areas in which the controls appeared to be inadequate or in which errors arising from noncompliance with regulations were significant.

While these were rather general procedures, the auditors were able to apply them with only minor changes in sample size, error definition, and sample selection method, depending on the particular characteristics of the activity and installation being examined. In addition, the field staffs from each installation were given freedom to expand the audit coverage to other tests if that was necessary to satisfy regular audit requirements.

The results of the test were quite encouraging, especially in regard to the relative usefulness of the statistical approach. Perhaps the most conclusive evidence available as to the usefulness of the statistical method lies in the opinions of the participating field audit personnel. Since the resident field personnel necessarily face somewhat different problems than do their supervisors, the elements of the test which most impressed the two groups were somewhat different.

Perhaps one of the most significant results of this field study was the demonstration of the usefulness of the *integrated* activity audit approach, particularly where manual accounting systems are used. In contrast to the normal audit program, which utilizes a *number* of separate samples drawn at *different* times, the activity was audited in this case for a large number of its procedures at the same time, using the single sample of documents. This change in general approach was not designed with any view toward either validating or invalidating the current auditing procedures or concepts followed by the Auditor General. The redesigned procedure was made simply for the purpose of obtaining the broadest possible audit coverage from the single sample, so that maximum current audit use could be made of the results. In the opinion of the field personnel, the integrated approach was beneficial in that they were able to make more meaningful recommendations for over-all as well as specific system improvements, they were better able to budget available audit time according to actual weaknesses in the system, and they obtained a clearer understanding of the over-all operations of the activity.

The base resident auditors who participated in the tests felt that the results were more helpful than normal audit results in making an over-all evaluation of the supply activity, in making specific audit recommendations for improvements in procedures, and in selecting areas for supplemental audit work. In addition, the field personnel were impressed by the representativeness of the samples. It is generally accepted by auditors that a sample drawn for audit should be representative of the entire group (universe) of transactions if meaningful conclusions are to be derived from sampling. The reports of the field personnel who performed the test indicated that the samples selected by statistical methods had, in fact, achieved a high degree of representativeness. This was confirmed by supplementary tests.

The opinions of the supervisory personnel who participated in the tests are particularly significant. These supervisors were strongly impressed with the control which the technique afforded them through (a) rigid and uniform predefinitions of errors and audit procedures; (b) design of uniform working papers; (c) objective and flexible sample selection methods; (d) predetermination of sample sizes; and (e) uniform methods for stating and evaluating results. Although only the last three of these elements are unique to the statistical approach, the use of statistics tends to enforce the others. Such rules permitted a more effective control of the audit and a more comprehensive review of the working papers. They also enabled the supervisor to come to uniform decisions on the results of audits, from installation to installation and from year to year.

Another consideration of interest to the Auditor General concerned the sample sizes which normally would be used. Although the field personnel were able to furnish only a general indication of the types of errors which required less precise estimates, sufficient data were obtained to enable us to determine the sample sizes necessary to meet future audit requirements just as quickly as these requirements were specified and converted into statistical terms.

Certain audit problems, unrelated to statistical sampling, also were uncovered by the tests. In those activities or installations where machine accounting methods or electronic data-processing systems were in use, rather than the more usual manual accounting methods, it was extremely difficult, and in some cases impractical,

to make a thorough audit of all phases of the operation on a post-audit basis. In such operations, therefore, a simultaneous audit seemed to be necessary. Even in such simultaneous audits, however, it was apparent that statistical sampling methods can still be used to determine the sample sizes, the appropriate sampling method, and the particular transactions which will be audited. There is also evidence that sample selection and many audit steps can readily be programmed and performed on the electronic equipment.

CONCLUSIONS

As mentioned above, the Auditor General completed several statistical sampling tests in its internal audit areas, such as military pay, supply transactions, and motor vehicle inventory control, and is currently proceeding with further applications. Tests also have been programmed in the contract audit area where costs on defense contracts are examined. As in any experimentation, a number of problems have been encountered. However, valuable experience was acquired in the initial tests, and these lessons have been applied successfully to later applications. In summary, the tests to date have shown that:

1) It is practical to apply statistical sampling techniques to the audit of Air Force activities.

2) There are a number of audit areas, other than supply operations, to which these statistical sampling techniques can be applied effectively, such as military payrolls, motor vehicle inventories, and stock funds.

3) Such techniques will enable auditors to evaluate better the effectiveness of their test checks (samples).

4) The use of this objective method for selecting samples will increase the effectiveness, reliability, and uniformity of the audit findings.

5) Statistical sampling methods should be useful in audits of procurement contracts, as well as in finance activities and in accounting operations.

The Auditor General plans to study the major audit areas, determine their suitability for use of statistical techniques, and extend the use of statistical methods as rapidly as personnel can be trained and guides and instructions can be issued for their use.

Harold Bierman, Jr., and David Green

Accounting for Income—The Problems Arising from Certificates of Necessity

The authors consider certain unresolved problems pertaining to certificates of necessity. After discussing these problems, they suggest that a long-life asset has two separate characteristics—its utility as a service-producing mechanism and its utility as a tax deduction—and they describe a treatment of accelerated amortization which provides for analysis of these characteristics.

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OF THE problems facing the accounting profession, one of the most compelling is the continuous need for reviewing prevalent accounting methods to ensure that accounting reports are as meaningful as possible. The purpose of this paper is to examine critically accounting method as it pertains to the income and financial position of a firm amortizing assets under certificates of necessity. Under the provisions of these certificates, firms may write off (amortize) for tax purposes all or a portion of the cost of long-life assets in a sixty-month period. This raises several problems from the accounting point of view—some of which are, at this date, unresolved.

The 1954 survey of the financial statements of 600 companies, conducted by the American Institute of Accountants, revealed that 154 companies made reference in their reports to the amortization of emergency facilities under certificates of necessity.[1] A further analysis of these 154 companies indicated that:

121 firms deducted accelerated amortization for both tax and accounting purposes;

25 firms deducted accelerated amortization for tax purposes only and provided for the "deferred tax benefit;"

8 firms deducted the accelerated amortization for tax purposes, but failed to state whether they had provided for the "deferred tax benefit."

Thus the first point of confusion has been established—the differing methods of computing "accounting" income. In accounting for period income, some firms deduct the accelerated depreciation authorized by the certificate of necessity, some deduct the tax "saving," others do not care to state what they do. A second point of confusion arises from the practice of deducting the tax saving rather than deducting the accelerated depreciation. The "tax saving" was accounted for in three different ways:[2]

2 firms deducted the amount from the related asset;

4 firms placed the amount with current liabilities;

22 firms placed the item above the stockholders' equity section.

A LOOK AT TWELVE STEEL COMPANIES

The steel industry in recent years has made substantial investments in plant, which were covered by certificates of necessity. The industry also makes use of relatively large amounts of depreciable long-life assets. (It is exceeded only by the public utility industry.) This results in the depreciation charge being an important item in computing the income of a steel company. What has happened to the computation of accounting income under the certificates of necessity? To what extent has there been a failure to disclose significant financial information? Among other things, the incom-

[1]American Institute of Accountants, *Accounting Trends and Techniques*, 9th ed. (New York, 1955), p. 142.

[2]*Ibid.*, p. 103.

pleteness of the following table illustrates the failure of some companies to disclose relevant information.

Table 1. Twelve steel companies—selected financial information for 1955 (money figures in millions).

Company	Total depreciation (including depreciation of emergency facilities)	Depreciation of emergency facilities	Addition to taxes (for amount saved by using the certificates§)	Reported income after taxes	Depreciation in excess of normal
Armco	$ 33.9	$ 19.5	$—	$ 66.6	$?‡
Bethlehem	102.7	62.0	—	102.7	?
Crucible	10.7	5.9	—	13.3	4.4
Granite City	5.2	x†	3.9	12.6	7.6*
Inland Steel	21.5	10.6	—	52.5	?
Jones & Laughlin	37.0	?	10.3	50.1	?
Kaiser Steel	14.4	x	4.8	5.7	9.7*
National Steel	40.2	?	—	48.3	?
Pittsburgh Steel	5.7	x	3.2	7.5	6.5*
Republic	45.5	24.9	—	86.3	?
United States Steel	285.2	147.7	—	370.1	?
Wheeling Steel	15.8	6.0	—	17.3	?

*Deducted for tax purposes only.

†The x indicates that the information is not needed.

‡The ? indicates that the information is desirable.

§This amount added to the actual income tax gives the tax that would have been paid if the certificate of necessity were not used.

Of the twelve companies studied, four did not deduct the full depreciation of emergency facilities in computing periodic income. Rather they added the amounts shown in column 3 to the actual tax liability, to compute the reported after-tax income for the period. These four companies (Granite City, Jones and Laughlin, Kaiser Steel, and Pittsburgh Steel) supplied information adequate enough for an analyst to adjust the income for the period to a basis comparable to the other eight companies. Unfortunately, this would solve the problem in the wrong direction. It would be better to adjust the incomes of the eight companies so as to place them on a comparable basis with the minority of four. From the information given, only Crucible's statement may be adjusted. The income for 1955, adjusted to a comparable basis to the four companies, would be $15.4 million instead of $13.3 million.

Computation of adjustment:	
Income as reported	$13.3
Add back:	
Depreciation in excess of normal	4.4
	$17.7
Subtract:	
Tax "saving"[3]	2.3
Adjusted income	$15.4

Some of the remaining companies noted the depreciation of the emergency facilities, but they did not specify the amount of that depreciation which is in excess of normal depreciation. It would be possible to adjust the incomes using some reasonable basis for adjustment. For example, the normal depreciation may be assumed to be 20 per cent (a life of approximately twenty-five years) or 25 per cent (a life of approximately twenty years) of the *annual depreciation charge* taken on the "emergency facilities." This computation was not attempted here since this paper proposes to point out some weaknesses in financial reporting and to offer a possible solution, and not to measure the income of the twelve steel companies mentioned above. The following sections will investigate the entire question of the significance of taking different depreciations for tax purposes rather than for financial reporting purposes. Attention will be focused on the specific problems arising from the use of the sixty-month certificates of necessity, but the problems and principles are equally valid for the use of the procedures of accelerated depreciation, newly allowed in the 1954 Internal Revenue Code.

HOW THE FINANCIAL STATEMENTS ARE AFFECTED

There are several compelling reasons why management should avail itself of the privilege of a rapid depreciation write-off under the provisions of the well-known certificates of necessity.[4] Having so elected, it becomes necessary to consider what influence the tax

[3]The tax saving results from using a sixty-month period *for tax purposes* to depreciate the emergency facilities.

[4]See Clifford D. Clark, "Economic Appraisal of Depreciation Policy," *Journal of Business*, 24 (Jan. 1956). Attention is called to his first footnote.

effects exert on the financial statements. Whenever the depreciation taken for tax purposes is greater than the depreciation that would ordinarily appear on the income statement, both the balance sheet and the income statement are affected.

To illustrate: Suppose a company under a certificate of necessity has acquired facilities costing $1,000,000 with an estimated useful life of ten years; also, that its annual profit is $400,000 before any depreciation on this new facility.[5] Then its partial income statement might read as follows:

Profit before depreciation on new facility	$400,000
Straight-line depreciation charge	100,000
Profit subject to federal income tax	$300,000
Federal income tax (assume 50-per-cent rate)	150,000
Profit after depreciation and income tax	$150,000

The tax return would read somewhat differently:

Profit before depreciation on new facility	$400,000
Depreciation under certificate of necessity	200,000
Profit subject to federal income tax	$200,000
Federal income tax at 50 per cent	100,000
Profit after depreciation and income tax	$100,000

The reported income would be $50,000 greater than would be reported if the taxes had not been reduced by the extra depreciation charge allowed under the certificate. The position statement would also be increased by $50,000 of net assets. If the extra depreciation had not been taken, the tax liability would be increased by $50,000.

PROCEDURE RECOMMENDED IN THE PAST

What should be done by the accountant to reconcile the tax return with the income statement? One of the early, authoritative positions was as follows:

> Where the resulting reduction in current income tax is material... a portion of the excess of the amortization over normal depreciation (equal in amount to the tax reduction resulting therefrom), should be

[5] Profit before depreciation is an inexact phrase used here to simplify the illustrations.

included in the income statement either as additional depreciation or as a special charge and credited to an appropriate reserve or other account.[6]

In our illustration the tax reduction would be $50,000. This is equal to the tax rate of 50 per cent applied to the difference between the special depreciation of $200,000 and the normal depreciation of $100,000. This $50,000 would be used to increase (debit) depreciation and increase (credit) an equity account such as reserve for income tax. The revised income statement might then appear in this way:

Profit before depreciation on new facility	$400,000
"Corrected" depreciation	150,000
Profit subject to federal income tax	$250,000
Federal income tax (per tax return)	100,000
Profit after depreciation and income tax	$150,000

This revised income statement is unfortunate on two counts. First, the depreciation shown is different from the amount which would normally result from an attempt to equitably allocate cost to the period in which the facility's service is utilized. In fact, other things being equal, the depreciation charge would usually vary with the tax rate. An increased tax rate would give rise to an increased tax reduction which would result in an increased depreciation charge. A decrease in rate would require a decrease in depreciation charge. A second unfortunate aspect of the revised income statement is its failure to assume a logical relationship, rate-wise, between the deduction for federal income tax and the taxable income.

PROCEDURE PRESENTLY RECOMMENDED

The date of *Bulletin* No. 23, recommending the above procedure, coincided with the decline of war production and with the rise in importance of certificates of necessity. This might explain why strong exception was not taken with the position advocated by the Committee on Accounting Procedure.

[6]Committee on Accounting Procedure, American Institute of Accountants, *Accounting for Income Taxes (Accounting Research Bulletin* No. 23; New York, Dec. 1944), p. 190. (This bulletin has been codified in *Bulletin* No. 43, sec. 9c.)

The advantages, however, of hasty depreciation write-offs, in the presence of high tax rates in expanding production of particular kinds of material, had been demonstrated. It was only a few years later that it was thought desirable to resort to this device again. At this time the Committee on Accounting Procedure again considered the confusion attendant to proper reporting when depreciation for tax purposes was materially larger than the "appropriate" amount for cost amortization. The committee concluded that the amount of the tax "saving" or deferment should be shown in the income statement as a charge for additional income taxes: "The related credit in such cases would properly be made to an account for deferred income taxes."[7] The committee advocated consuming these deferred income taxes in the period subsequent to the hasty amortization. An illustration of the technique might be helpful.

Using the same data as in the first illustration, the partial income statement would read:

Profit before depreciation on new facility		$400,000
Straight-line depreciation charge		100,000
Profit subject to federal income tax		$300,000
Federal income tax:		
Per tax return	$100,000	
Additional charge	50,000	150,000
Profit after depreciation and income tax		$150,000

Given no other changes, the next four annual profit statements would read the same, and at the end of five years the additional charges for income tax would be $250,000 (five years times $50,000 a year). The "liability" or "reserve for income taxes" appearing on the balance sheet would also be $250,000 after five years had elapsed.

For years six through ten, the partial income statement would be as follows:

[7]Committee on Accounting Procedure, American Institute of Accountants, *Emergency Facilities—Depreciation, Amortization, and Income Taxes (Accounting Research Bulletin* No. 42; New York, 1952), p. 310. (This bulletin has been codified in *Bulletin* No. 43, sec. 9c.)

Profit before depreciation on new facility		$400,000
Straight-line depreciation charge		100,000
Profit subject to federal income tax		$300,000
Federal income tax:		
Per tax return	$200,000	
Less: Previous provision	50,000	150,000
Profit after depreciation and income tax		$150,000

This would "consume" the deferred income tax at a rate of $50,000 a year, and the balances in this "liability" account would then be $200,000, $150,000, $100,000, $50,000, and zero, at the end of years six through ten, respectively.

The adoption of this procedure gives rise to identical reports of income for the ten years, where the only item changed is the actual income-tax payment. When management avails itself of the advantages of this rapid write-off for tax purposes, the use of this procedure ensures that: "the net income will more nearly reflect the results of a proper matching of costs and revenues."[8]

SOME NEGLECTED ASPECTS

But there are some issues at stake other than this smoothing or averaging of net income after federal income tax, and paradoxically, they, too, result from the accounting for federal income taxes. Heading the list is the notion that part of the "value" of an asset, at least insofar as it is a deferred cost, is its deductibility for tax purposes. That is, as far as net income after taxes is concerned, an asset with a cost of $100 deductible for tax purposes is more valuable than an exactly similar asset with a cost of $100, not-so-deductible. In fact, if the tax rate is 50 per cent, the first is worth approximately $50 more than the second. That this has been given little attention in the literature is understandable if we but remember that this distinction is seldom useful. In the few periods when the distinction was important, the urgency passed before the issues were settled.

The amounts involved when business firms use accelerated de-

[8] *Ibid.*, p. 1.

preciation are not inconsiderable, however. A recent estimate indicates that some $21 billion in facilities are eligible for a rapid write-off and that, of the total annual depreciation and amortization charges of $14.5 billion, some $3 billion represents accelerated amortization.[9] Of a total depreciation and amortization amounting to $285 million in 1955 reported by the United States Steel Corporation, $148 million represented amortization of facilities covered by certificates of necessity. Thus, about 52 per cent of the total depreciation charge was represented by the accelerated depreciation. (In 1954 it was 55 per cent.) For Bethlehem Steel Corporation the portion of the total 1954 depreciation ascribed to accelerated depreciation was 60 per cent—$62 million accelerated and $41 million "regular." (In 1954 it was 58 per cent.) During 1954 the amount charged against income by the General Motors Corporation for depreciation and obsolescence was $233 million, of which some $44 million arose from accelerated depreciation. Westinghouse Electric Corporation reported that the amount of depreciation taken via certificates of necessity *exceeded* normal depreciation by some $10 million, whereas the total depreciation approximated $38 million.

Those who advocate special accounting treatment where the amounts for accelerated depreciation are material find it disconcerting to discover that the several companies mentioned above disclose the effects of hasty write-off inadequately in their financial statements. Some of the necessary information is given in the text of the annual report, but this would seem to be insufficient inasmuch as the annual statistics of earnings per year, per share, and so forth, are developed from the "unadjusted" income statement. In balance sheet terms, the problem of "hidden assets" arises where the allowance for depreciation is overstated by charges which are greater than those which would result from the attempt to spread the asset cost over the expected useful life.[10]

[9] *Survey of Current Business*, Dec. 1955, p. 12.

[10] Depreciation accounting has been defined as "a system of accounting which aims to distribute the cost or other basic value of tangible capital assets, less salvage (if any), over the estimated useful life...in a systematic and rational manner" (American Institute of Accountants, *Report of Committee on Terminology* [*Accounting Research Bulletin* No. 20; New York, 1943], p. 167).

Assets are understated by the overstatement of the contra account "allowance for depreciation."

REPORTING PROBLEMS

The specific accounting issues created by using rapid depreciation are:

(1) Determining the proper amount of depreciation to be charged periodically when "ordinary" depreciation differs from "tax" depreciation;
(2) Interpreting the income tax effects of rapid write-off (both the expense and the liability);
(3) Disclosing the "proper" unexpired costs (assets) on the position statement.

Today, some firms use "ordinary" depreciation and others use accelerated depreciation; some use the actual tax expense and others use the tax expense that would have been. The many combinations which result impart confusion to the computation of corporate income. The financial analyst is confronted with fewer comparable financial statements. The book value per share and earnings per share, already suspect, are therefore rendered less useful as analytic tools.

Some insist that the same depreciation charge should be used for reporting purposes as is used for tax purposes. This position is reinforced by the argument that the so-called "normal" depreciation is inadequate because of the change in the price level and that the inadequacy of the depreciation charge based on unadjusted cost is offset by the larger charges of rapid depreciation.[11] In addition, there is a reluctance to show anything in the income statement but the actual tax expense. This reluctance has some justification since predicting the future tax saving has its difficulties. Tax rates may change, or the company may not have sufficient earnings in the future to require payment of the predicted taxes. The actual tax liability, however, is obtained by the use of accelerated depreciation for tax purposes. Since there has been a departure from normal accounting procedures in measuring taxable income, the "real" expense may be equal to the tax that would have been paid if rapid depreciation had not been used.

[11]See the 1954 Annual Report of the United States Steel Company for an expansion of these arguments.

RAPID DEPRECIATION AND THE CHANGE IN THE PRICE LEVEL

The proper amount of depreciation to be charged periodically on the income statement should be a function of the expected economic life of the assets involved, and tax considerations should not be considered relevant. That is, the periodic depreciation charge should be the result of an attempt to equitably allocate the cost to periods in which the asset's service is utilized. An equitable allocation may be determined through the use of any one of several methods—straight line, any of the declining charge methods, interest method, and so on.

Using rapid depreciation as a solution for difficulties which are created by changes in the price level is inexpedient. It is a "jury rig" remedy which cannot succeed in accomplishing its mission (rectifying inequities caused by inflation). Rather, it succeeds in confusing the issues. Rapid depreciation merely rearranges the periods in which the depreciation is charged. If the depreciation is charged in an earlier period, a period in the future will have that much less depreciation. This later period will have neither rapid depreciation, normal depreciation, nor depreciation adjusted for changes in the price level. It will have "inadequate" depreciation, perhaps none, even though the assets are being utilized.

POSSIBLE TREATMENT—RECORDING FIXED ASSETS AND THEIR DEPRECIATION

For purposes of analysis it is convenient to think of the long-life asset as having two separate and distinguishable characteristics—its utility as a service-producing mechanism and its utility as a tax deduction, or tax-reducing mechanism. For example, if the tax rate is 50 per cent, the willingness to pay $10,000 for an item of equipment might reflect an expected service potential net of taxes of $5,000 and a tax benefit of $5,000 (50 per cent of the cost of $10,000). In any analysis this tax benefit is or should be part of the decision as to whether or not to buy.

Assume that the acquisition of a machine was recorded in two accounts—one for services, the other for tax benefit. We would have two assets to be amortized. If the services were to be written off over the ten-year useful life, the annual charge would be $500; if

the tax benefit were to be written off over ten years also, the annual charge would be $500. The sum of the two annual charges would be $1,000, and this does not differ from the charge that would result from the normal accounting allocation of expense for a $10,000 asset expected to serve ten accounting periods. Now suppose that the asset is to be written off over five years for tax purposes. The annual charge for service benefit would continue at $500, but the annual charge for tax benefit would increase to $1,000, and the actual taxes would be reduced $500. If two "contra" or "offset" accounts were used, one might be the usual allowance for depreciation; the other would be, say, accumulated deductions caused by rapid write-offs. At the end of five years, the allowance for depreciation would have a balance of $2,500 and the accumulated deductions caused by rapid write-offs would have a balance of $5,000. On the balance sheet after the five years, the accounts would appear as follows:

Asset—cost of tax benefit	$5,000	
Less: accumulated deductions	5,000	
Balance		—0—
Asset—cost of service potential	$5,000	
Less: allowance for depreciation	2,500	
Balance		$2,500

In each of the next five years the depreciation charge would be $500 for the write-off of service potential. For tax purposes the asset is fully amortized; thus taxes will increase $500 (50 per cent of the $1,000 deduction allowed in previous years). The sum of these amounts is $1,000 and equal to the net deductions for the first five years.

SUGGESTED TREATMENT—RECORDING FIXED ASSETS AND THEIR DEPRECIATION

It was stated above that where the write-off for tax purposes was over the same period of years as the economic life, the sum of the annual charges ($500 plus $500) was equal to the charge that ordinary accounting procedure would develop ($10,000 divided by ten years). We are primarily interested in the instance where the two write-offs differ. Because the division of the asset cost into two

components is relatively difficult, we suggest carrying the asset in one unexpired cost (asset) account and emphasizing the use of two contra asset or offset accounts. These offset accounts would be the usual allowance for depreciation and an account which would show the *net effect* of the larger depreciation charge appearing on the tax return and which would be entitled "Accumulated Deductions Caused by Rapid Write-off." This account will be increased by annual amounts determined by multiplying the extraordinary portion of the depreciation charge by the tax rate prevailing at the time the asset is being amortized. This increase in the offset account will be matched by a debit to an account "Adjustment to Expense Caused by Rapid Write-off."

These entries would be as follows:

(1) Dr. depreciation expense	$1,000	
Cr. allowance for depreciation		$1,000

To record the ordinary depreciation (made in each of the ten years of life)

(2) Dr. adjustment to expense caused by rapid write-off	$500	
Cr. accumulated deductions caused by rapid write-off		$500

To record the "expense" for the accelerated depreciation and increase the related asset offset (made in each of the first five years)

(3) Dr. income taxes	xxx	
Cr. income taxes payable		xxx

To record the *actual* income taxes owed to the government.

At the end of five years, the balance sheet would show:

Asset—Cost	$10,000	
Less: Allowance for depreciation (5 years @ $1,000)	5,000	
	$5,000	
Less: Deductions caused by rapid write-off (5 years @ $500)	2,500	
Balance		$2,500

This balance is the same as the one resulting earlier; both differ from the balances which would emerge if *Accounting Research*

Bulletin No. 42 were followed. Adherence to *Bulletin* No. 42 would require the following accounts and amounts:

Under the heading of assets

Asset—Cost	$10,000
Less: Allowance for depreciation	5,000
Balance	$5,000

Under the heading of liabilities other than current:

Reserve (or provision) for future income taxes	$2,500

This procedure differs from the system being developed in the interpretation of $2,500 credit, and the $500 debits resulting from the decrease in taxes in each of the first five years.

The entries of the five years after the asset has been fully depreciated for tax purposes are of interest:

(1) Depreciation expense	$1,000	
Allowance for depreciation		$1,000

To record the ordinary depreciation

(2) Accumulated deductions caused by rapid write-off	$500	
Adjustment of expense		$500

To adjust the expenses for the fact that taxes are $500 higher than they normally would be.

(3) Income taxes	xxx	
Income taxes payable		xxx

To record the actual income taxes owed to the government. All other things being equal, these taxes will be $1,000 greater than in each of the first five years. Thus the total deductions from revenues will be equal in each of the ten years. This is illustrated in Table 2.

CONCLUSIONS AND RECOMMENDATIONS

What is the nature of the account "Reserve for Income Tax Savings"? It is clearly not part of the stockholders' equity, nor is it a liability at this time. It may become a liability to the government in the future, but this possibility is not sufficient reason for its appearance in the position statement at this moment in time.

If the fixed assets had a value of $100,000 at the beginning of the

Table 2. Two income statements.

	Income statement for one of first five years		Income statement for one of second five years	
Profit before depreciation		$2,000		$2,000
Depreciation	1,000		1,000	
Adjustment caused by rapid write-off	500		(500)	
	1,500			
Income taxes	–0–*	1,500	1,000†	1,500
Net income		$500		$500

*The taxable income is zero since the depreciation allowable for tax purposes is $2,000.

†The taxable income is $2,000 since the depreciation allowable for tax purposes is zero. Thus the actual tax is $1,000.

period, and if normal depreciation were $10,000, but if more than normal depreciation were taken for tax purposes, then the fixed assets would have decreased in value by more than $10,000. This statement implicitly assumes that a purchase of fixed assets is not only a purchase of productive services, but also the purchase of the right to certain tax deductions. When these tax deductions are utilized, the value of the asset decreases. If this reasoning is correct, then the account "Reserve for Income Tax Saving" should be interpreted to be a contra asset account and should be subtracted from the depreciable fixed asset total.

In normal accounting procedures the accountant does not attempt to split the purchase price of a depreciable asset between the amount paid for productive services and the amount paid for future tax deductions; it is at best a difficult task because of the many assumptions required. Among others, it requires assumptions about the future tax rates, the purchaser's determination of the income-producing contribution of this asset, and the purchaser's interest in minimizing losses or maximizing gains. The accountant bypasses the problem of placing numerical values on these questions. He assumes that the purchaser of a fixed asset is buying the asset for the services it will produce and not for the tax reductions, on the assumption that they are merely a by-product of the purchase and the income-tax laws. In fact, there are two things of value purchased, the bundle of services and the right to deduct the cost of the asset from revenues in order to compute taxable income.

If more than normal depreciation is taken for tax purposes, it is still possible for the accountant to show: (1) the "ordinary" tax expense, that is, the amount exclusive of the rapid depreciation reductions; (2) the actual tax liability; and (3) the accountable fact that the particular asset has lost some of its tax-reducing value. This accounting procedure (the use of an asset offset account) would have the virtue of correctly stating the asset position of the firm and the debts owed by the firm. It avoids the pretense that two assets of the same cost—exactly alike in physical and income earning characteristics—are of equal value if only one of them can be deducted for tax purposes. Subsequent to the period of acceleration, the asset whose depreciation was accelerated has less value for the remainder of the useful life than an asset which was similarly acquired but depreciated normally for tax purposes.

The business community must take note that, from the point of view of logic and usefulness, present procedures are inadequate. It should insist on the following:

(1) That depreciation is a function of the expected economic life of the assets employed and that tax considerations are not relevant for this computation.

(2) That the amount charged against the period's pretax profit be shown in two parts: (a) the actual tax expense of the period (which is matched by a liability to the federal government), and (b) another "adjustment to expenses" account charged with the decrease in value of the asset caused by the use of accelerated depreciation for tax purposes. The amount would be equal to the reduction in ordinary income tax caused by accelerating the depreciation. The asset's carrying value should be decreased by an equal amount using a contra asset account. (Parts (a) and (b) may be added to reflect the "ordinary" tax.)

(3) That the unamortized dollar value of the fixed assets for tax purposes should be disclosed in financial reports, since this information does have financial significance.

Robert J. Trudel

Qualification Requirements— A Problem Facing Accountants in the Federal Government

The current trend toward the lowering of qualification requirements for accountants applying for government positions is not a sound practice and it can harm the accounting profession. Qualifications for professional government accounting positions should remain high. In order to meet the existing demand for more accountants, jobs requiring scant preparation and training should be classified as nonprofessional. Distinguishing between professional and nonprofessional accounting jobs will not only provide a basis for better placement and utilization of personnel but also will help retain the quality standards of the accounting profession.

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THERE is an amazing paradox present in the accounting field in government today. On the one hand, the accounting programs of the various agencies have been growing more complex as a result of the activities of the Joint Program for Improvement of Accounting, the recommendations of the Hoover Commission, the recent legislation on accounting and budgeting, the intensified interest in accounting at the Bureau of the Budget, the greater awareness by operating officials of the managerial value of accounting data,

and various other factors. This has resulted in a loud, persistent, urgent, and ubiquitous demand for more accountants and for a better quality of accountant. The justification for these demands is quite apparent.

At the same time, the shortage of available accountants has led to an equally loud, persistent, urgent, and ubiquitous demand for a lowering of qualification standards so that the less thoroughly qualified accountant may be hired and so that heretofore-unqualified clerical employees may be converted to professional accountants in a short time.

The paradox lies in the fact that the two demands are mutually contradictory when applied to the same job or group of jobs.

SCANT TRAINING REQUIREMENTS

Some specific examples of proposed training programs and proposed changes in qualification standards may illustrate the gravity of the situation.

(1) One training program would have provided fewer than 100 clock hours of instruction in elementary accounting to payroll clerks, voucher examiners, allotment accounting clerks, and similar employees in GS-3 and GS-4 positions; after this they would have been promoted to professional accounting positions in GS-5.

(2) Another training program would have required payroll clerks, voucher examiners, allotment accounting clerks, and similar employees in GS-3 and GS-4 positions to read a few accounting textbooks at home, rotate in clerical assignments over a period of a few months, and pass a college-level test in principles of accounting; after this they would have been promoted to professional accounting positions in GS-5. (Realistically, how much chance have these employees of passing a reasonably comprehensive accounting test which even accounting majors find difficult?)

(3) There has been a proposal to change the nationwide examination for Accountant GS-5 so as to accept as fully qualified those students who have completed only 18 semester hours in accounting courses, whereas 24 are currently required.

Is there so little substance in accounting that it can be adequately taught in 100 hours of instruction to high-school graduates? Is there so little complexity in accounting that it can be adequately

learned by high-school graduates through the reading of a few textbooks at home? Is there so little knowledge required of accountants that 18 semester hours of study are sufficient when other professions ordinarily require 24 or more?

If these questions may be answered affirmatively, then comparisons between accounting and other professions will inevitably follow with probable results that will be extremely odious to accountants in general.

ADEQUATE TRAINING FOR JOB ASSIGNMENTS

On the other hand, protests that scanty programs of this kind completely fail to provide even a bare minimum of professional capability are met by the response that employees so trained will be able to do the jobs to which they will be appointed.

This is true beyond doubt. But being true, it is merely a very convincing argument that the jobs to be filled by persons so scantily qualified are *not* professional accounting positions. The basic idea behind these training programs is sound. The training programs themselves are proper and desirable; they will provide employees adequately equipped to perform the work to which they will be assigned. The error lies in considering the positions to be so filled as professional accounting positions.

There is a principle applicable to this situation which seems to be present in all true professions. While it can be stated in many ways, the following wording seems to convey the meaning very well: *If substantially less than full professional qualifications are adequate for a job, then that job must be less than a professional one.*

ASSIGNMENTS REQUIRING LESS THAN PROFESSIONAL QUALIFICATIONS

Another way of stating this is that not every individual task performed by a professional worker is itself professional; hence an aggregation of such nonprofessional tasks is also nonprofessional, even though each one can be found in positions which are truly professional by reason of other tasks or duties.

Specific examples of the application of this principle in various professions, including accounting, can be cited:

A candidate is *not* admitted to the rank of C.P.A. until he passes the entire C.P.A. examination and presents all of the requisite education and experience.

A nurse is not admitted to the practice of medicine because she can dress wounds and skillfully use a hypodermic needle. The fact that physicians can and do perform these tasks also does not make a doctor of the nurse.

A salesman is not admitted to the practice of law merely because he can and does prepare contracts, nor do we call him a lawyer.

Why, then, should we now be faced with an insistence on calling persons professional accountants when their only claim to that title is that they do some, but not all, of the kinds of work that accountants have done; or that their duties have grown somewhat more complex or more difficult than formerly; or that they have received some of the instruction which is also given to accountants?

Another approach toward solving personnel shortages is to expand the apparent supply of eligibles by lowering the qualification requirements so that more persons can meet them.

EDUCATIONAL REQUIREMENTS FOR A PROFESSIONAL ACCOUNTANT

At this point obvious questions may arise as to what may be the proper educational qualifications for a professional accountant. Is a requirement of 24 semester hours in accounting subjects (or the equivalent) an arbitrary and unreasonable requirement? Is the insistence on "full professional qualification" or 24 semester hours a device for restricting competition and protecting those already in the profession?

Obviously, a requirement of 24 semester hours in accounting subjects is in a real sense arbitrary. It is no more arbitrary, however, than is the 18 semester hours sometimes proposed, nor is it more arbitrary than the requirement of most colleges and universities for 120 or more semester hours of study for a bachelor's degree. Any purely quantitative measure of educational or knowledge requirements is in a sense arbitrary. How restrictive such a measure may be depends upon the basis on which it was established.

A study, released recently by the American Accounting Associa-

tion,[1] of the requirements of 100 colleges and universities which train accountants reveals that 100 per cent require 120 or more semester hours for graduation and that of this number 87 per cent *require* (not merely offer) 24 or more semester hours in accounting subjects. Actually, 69 per cent require 25 or more semester hours in accounting subjects. The median requirement was found to be 28 semester hours in accounting, with the range from 12 to 44. The study firmly recommends as most desirable a requirement of between 24 to 30 semester hours in technical accounting courses.

A report recently released by the American Institute of Accountants[2] strongly recommends the addition of a fifth year to the normal college course to provide a number of technical accounting courses considered necessary and desirable which are not possible in a four-year course.

Clearly, on the basis of these two studies, 24 semester hours in accounting constitute the minimum requirement of the great preponderance of accounting schools, and the professional opinion for the future seems to lean toward more, not less, technical education.

There is another way to look at the 24-semester-hour requirement, and that is in terms of what it will buy in actual courses. The study by the American Accounting Association cited earlier reveals that almost all accounting schools require courses in elementary, intermediate, and advanced accounting and that these usually total approximately 15 or 16 semester hours. This would appear to provide the basic core knowledge of the professional accountant. Most of these schools also require courses in cost accounting, auditing, and income tax, and in most schools these courses total yet another 9 semester hours. Most schools also offer other accounting courses in such subjects as advanced cost accounting, analysis of financial statements, governmental accounting, accounting theory, budgetary control, internal auditing, machine accounting, investigations, and controllership.

[1] "Undergraduate Curriculum Study—Report of the Task Committee on Standards of Accounting Instruction," in *Accounting Review*, 31 (Jan. 1956), 36–42.

[2] *Standards of Education and Experience for Certified Public Accountants: The Commission Standards for Education and Experience for Certified Public Accountants* (Ann Arbor, Mich.: Bureau of Business Research, University of Michigan, 1956).

Is it possible to be a professional accountant without the basic 15 or 16 semester hours in fundamental accounting? Is it possible, with the emphasis in government today on cost accounting, on internal control procedures, and on establishing accounting systems tailored to meet local needs, that a professional accountant can be considered adequately educated without at least one course to expose him to each of these subjects? Perhaps so. It is certain, however, that a requirement of less than 24 semester hours in accounting will *not* produce this minimum exposure in most accounting colleges.

The preceding also points the way to answering the question of restricting competition through qualification requirements. Competition is always restricted by any qualification requirement which is not possessed by every employable person. The issue is whether or not the qualifications are set at a level which is unrealistically high in terms of the work to be done. If so, competition is being unfairly restricted; if not, the requirement merely assures competence. In the case of professional accounting, is the requirement of possession of the basic accounting courses and of a single course each in cost accounting, auditing, and one other subject unreasonably high? Are these courses unnecessary? If not, what are the actual knowledge requirements for competence in professional accounting?

It is a fact that a precise number of hours such as 24 may require adjustment. This is true in part because of variations in the semester-hour credit given by different colleges for essentially similar courses. One way to solve this problem is to express the qualification standards in terms of specific courses which must be completed rather than in terms of total number of semester hours required. If the basic standard is reasonable and accurate, however, the end result will not be greatly different in either case.

SETTING REQUIREMENTS IN TERMS OF NEEDS

One further point needs to be clearly understood. The qualification standards for entrance to the profession, that is, to grade GS-5 in the federal service, should be set in terms of the basic background needed for performance at or near the grade which is

typically appropriate for fully trained and competent professionals. The qualification standard should not be set on the basis of the limited responsibilities assumed in the entrance grade; otherwise the appointees will probably be inadequately equipped to profit from experience on the job and to progress to normal professional-grade levels.

Further, once basic knowledge requirements are determined which are substantially accurate and reasonable, attainment of these basic knowledges should be demanded of every entrant to every professional job, whether entrance be gained through college education, experience, or through agency-provided training programs.

Clearly, expanding the supply of professional accountants by lowering the qualification standards entails considerable risk unless it is done on a sound basis.

If an overnight conversion of clerks into accountants and an arbitrary lowering of qualification standards is either not feasible or not proper, what then is the answer to the apparent shortage of accounting personnel?

SOLUTION OFFERED BY OTHER PROFESSIONS

A partial solution to an equal or even greater shortage problem is being found in some other professions. Engineering, medicine, nursing, and some of the natural sciences can be cited as specific examples.

In these occupations there has been a careful sifting of duties, with the truly professional tasks being concentrated among the scarce, professionally qualified employees and the nonprofessional tasks being assigned to nonprofessional workers. In many cases this has required that the nonprofessional workers be given varying amounts of advanced training to fit them for duties formerly done by the professionals. In some instances, this training has been, in part, identical with portions of the training normally possessed by professional workers. The result of this training and this assignment of more difficult work to the nonprofessional worker has often meant the upgrading of his position. At the same time, the concentration of professional work in relatively fewer professional

positions has resulted in better utilization of the available professional workers and has also resulted in the frequent upgrading of these positions.

THE TREND IN GOVERNMENT ACCOUNTING

But notice the contrast to the apparent current trend in accounting, where the demand seems to be to include in the profession many persons not professionally qualified merely because their duties are growing more difficult; where many professionals appear jealously to guard, as professional work, many tasks which, when viewed objectively, seem to be clerical; and where the truly professional work is being distributed over so large a number of jobs that all are in danger of being evaluated at lower rather than at higher levels.

No occupation has ever achieved professional status without rising above the sea of routine and largely uncreative work in which most persons expend their efforts. No profession has improved its stature by gathering to its bosom a vast amount of routine work. Anyone who has ever computed an arithmetic average knows that increasing the number of low-value items in an array lowers its average. This is also the case with occupations.

Stated differently, other professions are moving upward and outward while sloughing off their lower extremities; the accounting profession in the federal service is expanding downward and is largely ignoring its current opportunity to reach upward and outward. In terms of relative standing with other professions, accounting in the federal service is losing ground.

AN APPROACH TO A SOLUTION

One sound approach to solving the shortage of accounting personnel is to use the available professional personnel wisely; to train the nonprofessional to do—in the capacity of a nonprofessional—much of the routine work now done by the professional accountant, even work that is difficult; and to concentrate the truly professional work in relatively fewer professional accounting positions. This is the process called "job engineering" by the personnel technician. In this way, supply and demand can be balanced without placing individuals in positions for which they are not qualified and

without designating positions as professional when these positions have no professional attributes.

This presumes the possibility of distinguishing professional from nonprofessional work. There is not room in this article to discuss this vexing subject, about which so many different opinions are held. But it is a subject to which the accounting profession must soon turn its attention if any distinction at all is to be achieved or maintained. Whether the distinction that could result would enhance or depress the stature of the profession will depend upon whether the profession is looking upward for its goal or downward, as it now seems to be doing.

The competent professional accountant need not fear for his job in reaching upward rather than downward. The profession cannot lose by hitching its wagon to a star instead of to a bookkeeping machine. For as far into the future as we can see there are likely to be more accountants' jobs than accountants. With proper job engineering and proper personnel utilization both the professional and the nonprofessional jobs in the accounting field can be enhanced.

Let no one construe this discussion to mean that it should be impossible for the clerk to become a professional accountant. Nothing is more fundamental than the American principle that everyone should be able to better himself. The ambitious employee should be encouraged and assisted in every way. What I have tried to say is that the ambitious and capable employee should be brought to the level of the profession so that the profession need not be lowered to the level of the clerk.

Robert W. King

The Electronic Computer

Electronic data-processing machines can be employed usefully only when there is a heavy volume of work involving a large number of similar operations. These machines can store information, they can perform all types of arithmetical operations, and through "programming" they can even make decisions. While they can perform all of these operations thousands of times faster than an individual, they are very expensive and hence are practical only where the volume of work is great.

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PICTURE in your mind, if you will, a clerk sitting at a desk. The clerk's job consists of (a) extending and totaling sales invoices; (b) comparing totals of sales invoices with predetermined credit limits; and (c) listing all sales invoices by invoice number, showing both customer name, invoice number and amount.

How does the clerk go about this job? The first step has five separate parts, as follows:

1) The clerk obtains the sales invoice from an "in-box" on her desk. (Input.)

2) She then operates a calculating machine, setting it to multiply quantity by price. (Control.)

3) The calculating machine performs the multiplication, and the product appears in the dials. (Arithmetic unit.)

4) The clerk writes the product down on the invoice. (Memory or storage.) She then returns to the calculating machine or to an adding machine to total the invoice (a repetition of part 3) and writes down the total on the invoice (part 4 repeated). In many cases she is required to compute a trade discount based on each item comprising the total invoice (an extension of part 3). After discounts are computed they must also be written down (an extension of part 4).

5) The completed invoice is then placed in a temporary "out-box" indicating that step a of the total problem has been completed.

The second and third steps are somewhat similar, in that they involve input, control, arithmetic unit, storage, and output. All these three steps, each of which consists of five parts or combinations of five parts, can be performed as a single operation by an electronic data-processing machine.

Any electronic data-processing machine can add, subtract, multiply, divide, and compare. In order to perform these functions, it must have data fed into it (input) in a certain form, it must have a control apparatus (the function performed by the clerk above), it must have an arithmetic unit (the calculating machine), it must have a means of temporarily or permanently storing information (referred to above as "memory"), and it must be able to show the result of its operation in some kind of usable form (output). Let us consider each of these five functions.

1) Input— The clerk picks up a sales invoice from her "in-box" at an average rate of, say, one invoice every three or four minutes.

Contrast — If an electronic data-processing machine is used, the input may well consist of punch cards which are fed into the machine at a rate of about 200 cards a minute. Or it might consist of magnetic tape, which a machine can handle at the rate of approximately 15,000 characters (single letters or single figures) a second.

In comparative terms, if the average invoice (at one every four minutes) is handled by the clerk and if each invoice contains four items to be extended, one minute is required for each transaction. At the rate of 200 cards per minute, the electronic data-processing

machine can handle input data 200 times faster than a clerk who handles one invoice every four minutes.

Since each word ordinarily consists of 10 characters, the magnetic tape will carry 1,500 words per second or 90,000 words a minute. Each transaction usually consists of two words, the number of units and the price. Thus, an electronic tape has a potential speed of 45,000 words a minute for cards, 225 times faster than punch cards, or 45,000 times faster than the clerk handling one invoice every four minutes.

Sometimes punched paper tape is used as the input medium, and experiments are constantly being performed to find other and faster means of feeding information into the machine. The feeding of data to the electronic data processing machine is a particularly difficult problem because the machine itself works at electronic speeds, which are much faster than any kind of mechanical feeding.

2) Control — After the clerk picks up the invoice, she knows from written instructions what she is supposed to do with it, and she proceeds to do it, thus controlling the total operation.

Contrast — In the case of the electronic data-processing machine this control is exercised by telling the machine in advance by a process known as "programming."

3) Arithmetic Unit — The clerk performs her calculation by using a calculating machine and possibly an adding machine. In addition, she further performs part of her operation in Step 2 by comparing the amount of an invoice with a predetermined credit limit.

Contrast — In the case of the electronic-data processing machine, all of these functions are performed in the arithmetic and storage units pursuant to the controls described in function b above. The comparison with the credit limit is accomplished in the machine by deducting the credit limit from the amount of the invoice. If the result is negative, the credit limit exceeds the amount of the invoice and the invoice is handled routinely. But if the credit limit is less than the amount of the invoice, the machine, by a "branching code," handles the invoice as "nonroutine," subject either to special scrutiny by the credit manager or to some other form of special handling.

4) Memory — The results of the individual extensions and the

totaling of the invoices are written on the invoice itself as a means of storing the information for subsequent use. Frequently facts of this kind are stored by writing figures in books such as journals, ledgers, and so forth.

Contrast — In the case of the electronic data-processing machine, the writing of facts for later reference is performed in some kind of memory apparatus whereby the results of an arithmetic calculation are stored in the form of magnetic spots on a revolving drum, or in a magnetic core, or on a magnetic tape, or in some other memory unit which utilizes the basic principles of the relationship between electricity and magnetism.

5) Output — The results of the work on the sales invoice are placed in the clerk's "out-box" in two groups. One group represents the cases in which the credit limits have been exceeded, the other cases where the credit limits have not been exceeded.

Contrast — In the case of the electronic machines, instructions can be fed to the machine by means of punch cards whereby all routine transactions can be handled in one manner, whereas non-routine transactions such as those where credit limits have been exceeded can be handled in another manner. Also, instead of physically handling the invoices in order to put them in proper order, the memory device can be utilized as a "sorter" so that the final listing of sales invoices by invoice number will be in proper order.

Several different types of output media are available, such as punch cards, magnetic tape, or printed records produced by a high-speed printer which will print a full-page listing in a very few seconds.

The calculation of payrolls is another area in which electronic computers have proved to be very valuable. The kind of information fed into the machine includes the current-period hours worked, basic salary, details of bonus plans (if any), deduction information for retirement and for payroll savings plans, information concerning state and federal income tax withholdings, and, where necessary, information concerning the distribution of payroll cost. In addition, the "year to date" card for each employee is fed into the machine. The machine calculates the net amount due each employee and also writes the check payable to the employee.

Also, it produces new punch cards showing the new "year to date" total for each employee, accumulates the various types of deductions, and punches cards showing the cost distribution.

In yet another application the machine can be used to calculate balances of items in stock. For example, if we have punch cards showing the number of items in stock at the beginning of the month for each of 1,500 different stock numbers, together with 100,000 transactions (in random order) reporting additions to stock and requisitions from stock, the machine can produce cards showing the new balance for each stock number without hand-sorting the documents. Some varieties of machines can even go one step further: they can be made to print a purchase order for any item of stock in which the new balance represents a quantity below a predetermined minimum.

HOW DO COMPUTERS WORK?

In a discussion of the mechanics of an electronic data-processing machine we must recognize the relationship between electricity and magnetism. We all know that an electric current passed through an electromagnet will energize the magnet. If such an electromagnet is placed immediately above certain kinds of metals, it will magnetize the spot on the metal which is nearest to the magnet. In reverse, if a magnetized spot on the metal is placed in close proximity to an electromagnet, a current of electricity will be generated.

The storage mechanism, therefore, is a collection of magnetic spots on a piece of metal. The spots are written there by electric currents passing through electromagnets, and the information contained in the magnetic spots can be "read" by placing an electromagnet in close proximity to it.

We might compare this arrangement with the keyboard of a standard calculating machine. A ten-bank calculating machine contains a total of 100 keys, ten each for the units position, the tens position, the hundreds position, and so on. As a key is depressed manually, the figure which it represents is temporarily stored in the mechanism of the machine. Then, when the crank is turned, the figures are transferred from the mechanism to the dials for subsequent visual reading. Similarly, each of the 100 keys on the

machine could be represented by a spot which, if magnetized, could be read by an electromagnet; the electric power generated by such reading could be increased through the use of electronic tubes so that the results of the reading would be punched on cards.

If we paralleled this exactly, the electronic calculator would have to have spaces of ten electronic spots for units, ten spots for 10's, ten spots for 100's, and so on. In order to cut down on the size of the machine, a number system known as the "binary" system has been developed. With this system any number from one to ten can be developed by a combination of the figures 1, 2, 4, and 8. Thus, if we wish to write the number "1" in the machine, it is done by energizing the spot for the first position only. The figure "3" is represented by energizing the figure "1" and the figure "2," the figure "9" is a combination of "1" and "8." Thus the 100 keys of the calculating machine are reduced to forty electronic spots. In another system known as the "bi-quinary" seven positions are used for each bank. In this system every figure is represented by a combination of two magnetized spots.

Central Processing Unit

Three of the functions listed above, namely, the control, arithmetic unit, and memory, are usually described as the "Central Processing Unit." It works like this: The instructions are placed in "storage" by means of predetermined program instructions. Then a punch card representing the first invoice item is placed in the machine. Based on the predetermined instructions, the following takes place:

1) The instructions are removed from the storage position (memory) to the control unit.

2) The first punch card is read, and the "quantity" (number of units) is placed in storage, temporarily.

3) The "quantity" is removed from storage, multiplied by the price per unit, and further multiplied by a discount factor if the program so instructs.

4) The product is placed in another memory position.

5) Subsequently, several products removed from memory are added together and punched on a card, or they may be handled in any other way according to instructions.

6) Finally, the machine goes on to the next instruction.

Decisions

We have all heard that these machines are able to make decisions. They do. For example, in the case of the "credit limit" described above:

1) The total of the invoice is determined. (Let us say that it is $150.)

2) The credit limit of, say $500, is subtracted from the invoice.

3) The result will be minus $350. When this figure is negative, the invoice obviously is less than the credit limit. So the invoice will be handled routinely.

4) But if the invoice is $1,000 and the credit limit is $500, the subtraction will show a "plus" $500. The machine can be instructed to list all "plus" answers separately, for special reference to the credit manager or for other handling.

UNDER WHAT CIRCUMSTANCES SHOULD THESE MACHINES BE USED?

A very large system such as Sperry-Rand's "Univac" or IBM's 705 is tremendously expensive. A complete Univac system, if purchased outright, costs approximately $1,000,000. IBM's 705 can be rented for between $30,000 and $50,000 per month. Both of these machines are extremely high-speed machines with tremendous storage capacity.

There are medium-sized machines such as IBM's 650. One of these with a 1,000-word storage capacity rents for $3,250 a month and one with a 2,000-word capacity rents for $3,750. The input of this machine is 200 IBM punch cards a minute, with an output of 100 IBM cards a minute. By means of additional attachments the speed of the IBM 650 can be increased tremendously, but the additional attachments, which utilize magnetic tape, rent for approximately $10,000 a month in addition to the rent of the basic machine.

There are many small machines on the market which will perform all of the functions described above but at a much slower rate of speed.

It is obvious that machines of this kind can be employed only when many similar transactions have to be performed and the volume is extremely heavy. There is a real danger that this equip-

ment may be purchased in situations where the work does not justify the expense. However, the machines are proving to be very economical for payroll work, inventory controls, the preparation of utility bills, the preparation of insurance premium notices, and other similar operations. The Treasury Department has installed a large IBM 705, which is used in reconciling accounts of the Treasurer of the United States, where approximately 300 to 350 million checks per year are written. Railroads and banks are also using the machines for various operations. In all of these cases, of course, there are large numbers of repetitive operations.

It is important to know the prerequisites of practical utilization of this type of equipment. If any operation consists of a tremendous number of repetitive transactions, it may be worthwhile to install electronic data-processing machines. But complete office procedures must be studied carefully, and the machine must be told, in advance, how to handle every type of transaction. Programming of this kind usually requires several months — perhaps even a year in long and involved types of transactions. I forecast that the greatest problems will be to say "no" to a proposed installation.

Tenner's Contribution to Governmental Accounting

IRVING TENNER'S death in December 1956 came as a shock to his friends and represents an equally serious loss to the field of governmental accounting.

His first contribution to this area was as a staff researcher for the National Committee on Municipal (later Governmental) Accounting, a position he took in 1934 at the age of twenty-six while still a graduate student at Northwestern University. This work brought him into close contact with such municipal accounting leaders, then members of the committee, as Lloyd Morey, George P. Ellis, and F. H. Elwell, and fortunately also under the direct tutelage of Carl H. Chatters, who had had broad experience as a city auditor and fiscal consultant. Tenner made the most of his opportunities; he was bright, imaginative, and productive, and soon he became the chief research staff accountant. He brought to his work a good theoretical knowledge of accounting (he then had his M.B.A.) and substantial work in economics (especially in public finance under Professor Herbert D. Simpson). Accounting and public finance, in that order, remained his lifetime interests. As the work of the committee progressed, he became accepted, despite his youth, as an able defender of his memoranda and research reports; more important, he grew steadily in his knowledge of governmental accounting. Chatters' parent organization, the Municipal Finance Officers Association of the United States and Canada, furnished

Tenner additional, parallel opportunities to broaden his experience in municipal finance as well as in accounting.

In retrospect, this connection of Tenner with the National Committee, almost from its beginning, was a most fortunate one, profitable for all concerned. He was to furnish to the committee a continuity in its research work, much needed particularly after its original Rockefeller grant (Laura Spelman Fund) money expired. Until his death in 1956, Tenner retained an unbroken tie with the committee, first as a staff researcher, next as chief staff accountant, and finally as its principal consultant.

Equally important for state and municipal accounting, Chatters and Tenner, sometimes in collaboration and sometimes individually, became two of the chief expositors and "salesmen" of the National Committee's work. Through the Municipal Finance Officers Association, the offer went out to city finance officers all over the country that if they would submit their financial reports to the Chicago headquarters, their reports would be constructively criticized for conformance or nonconformance with the National Committee's principles and standards. Much of this yeoman's work fell to Tenner's lot. Chatters and Tenner next collaborated with the American Water Works Association on a *Manual of Water Works Accounting* (1938), bringing the A.W.W.A., the M.F.O.A., and the National Committee into a desirable working arrangement within this municipal utility area. Chatters and Tenner next worked together on a textbook, *Municipal and Governmental Accounting,* the first edition appearing in 1940 and the second in 1947. This text was widely accepted and adopted. The third edition, in 1955, appeared under Tenner's name only. At his death this book remained one of the three leading governmental accounting textbooks.

After completion of his Ph.D. and C.P.A. requirements early in the 1940s, Tenner established his own accounting office in Chicago. Thereafter he combined fiscal consulting and part-time teaching with an accounting practice. In all three endeavors he established a fine reputation. His teaching included evening classes at Northwestern, Chicago, and Roosevelt Universities, and an annual two-weeks' course for public administration master's candidates at Wayne University. Two of his Wayne students, later Ph.D. students

at Cornell, have testified to his effectiveness as a teacher, even at the pace of six hours a day. His work as a fiscal consultant carried him to Washington on special assignments with the National Housing Agency (for an organization and methods survey during the war period), with an accounting task force of the Hoover Commission, and later with the General Accounting Office. The states of Illinois, Michigan, and Kansas, the cities of Detroit, Chicago, and New Orleans, and many smaller municipalities drew upon his services. In the professional societies he was a member of the Committee on Governmental Accounting of the Illinois Society of Certified Public Accountants and the American Institute of Accountants. He was also an active participant in regional conferences and training schools as a lecturer or forum leader. In all of this he had a wide opportunity to apply and to promote more and more general acceptance of the principles and standards of the National Committee.

During his twenty-two years of experience in governmental accounting, Tenner's writings were mainly in the state and municipal fields, but of especial interest to readers of *The Federal Accountant* are his publications in the federal area. They are few but of high caliber:

"Balance Sheets for the Federal Government," *Accounting Review,* 25 (Oct. 1950), 420–424.

Cost Accounting and Work Measurement in the Federal Government. (Municipal Finance Officers Association Cost Accounting Bulletin No. 4, 1942.) 72 pp.

"Federal Accounting," Chapter 24 in Chatters and Tenner, *Municipal and Governmental Accounting.* 1st ed. New York, 1940. Pp. 467–517.

"Special Considerations in the Application of Internal Control to Government," *Federal Accountant,* Special Issue, Jan. 1952, pp. 16–22.

When we turn to the state and municipal field, contributions under his name are numerous. His books and pamphlets include:

Financial Administration of Municipal Utilities. Chicago: Public Administration Service, 1947. 152 pp.

With Miner B. Phillips. *Financing Municipal Off-Street Parking Facilities.* Chicago: Municipal Finance Officers Association, 1948. 65 pp.

Functional and Cost Accounting in Baltimore. (MFOA Cost Accounting Bulletin No. 5, 1942.) 24 pp.

Governmental Cost Accounting in the Los Angeles Area. (MFOA Cost Accounting Bulletin No. 2, 1941.) 16 pp.

Michigan's Budget System. Detroit: Bureau of Governmental Research, 1946. 28 pp.

With Carl H. Chatters. *Municipal and Governmental Accounting.* 1st ed. New York, 1940. 794 pp. 2d ed. New York, 1947. 593 pp.

Municipal and Governmental Accounting. 3d ed. New York, 1955. 569 pp.

Municipal Finance Legislation, 1937: A Digest. Chicago, 1938. 74 pp.

"Principles and Standard Procedures for the Financial Administration of the State of Illinois." Appendix 1 in State of Illinois, *Annual Report of the Department of Finance.* Springfield, 1952. Pp 3A–66A.

Work Measurement in the City of Los Angeles Building and Safety Department. (MFOA Cost Accounting Bulletin No. 1, 1941.) 16 pp.

He also had under preparation at his death two additional studies. Space does not permit inclusion of a bibliography of his articles and book reviews. These appeared mainly in the *Municipal Finance* quarterly.

Much of Tenner's early work found its source stream in the work of Chatters and other members of the National Committee. But as his experience broadened, Tenner's writings took on an individuality and a depth which was his own. His combined experience as a researcher, teacher, systems designer, auditor, fiscal consultant, and general practitioner gave a rich coloration to his thinking and writing, and his academic training enabled him to interpret and generalize within a sound framework of accounting theory and public finance. All this was reflected perhaps best in the

provocative questions and problems material accompanying his textbook. Besides filling some of the gaps in the governmental accounting literature, he enriched it by a clarity of writing, by illustrations, and by the character of the issues he discussed. We find in his writings proof of the efficacy of cross-fertilizing accounting with economics, theory and teaching with practice, and work at one level of government with experience at other levels. Tenner was anything but a narrow specialist, and because of this he was a sharper governmental accountant.

As an individual he set himself big goals and worked toward them. He possessed a rare combination: a brilliant mind, energy, and orderly work habits. When he struck something "knotty," he persevered until he was its master. His standards of workmanship were high, and his pervading spirit was one of constructive optimism. He liked theoretical discussions and "idea conversation," but, with it all, was not overserious. He had a warm personality, liked a good joke (even if on himself), and with his immediate friends enjoyed good-humored bantering. Many of us outside the governmental accounting area but in a closely related discipline will miss his constructive interpretations of the contributions of accounting to our specialty and his discussions of the problems yet unsolved in the borderlands of related fields where public management must operate. And those of us who knew him well will miss his friendship.

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Technical Accounting Developments

THE 1958 BUDGET

The Budget of the United States Government for the Fiscal Year Ending June 30, 1958, was sent to the Congress on January 16, 1957. *The Federal Budget in Brief,* a condensed popular version of the *Budget,* was issued in February.

The 1958 budget document contains 46 cost-based budgets, an increase of 42 over the previous year. Cost-based statements were submitted in the budget justifications for 13 additional appropriations. The number of business-type budget presentations was increased to 120, four more than last year.

8TH ANNUAL PROGRESS REPORT

The 8th Annual Progress Report under the Joint Program to Improve Accounting in the Federal Government, covering the period from January 1 to September 30, 1956, was issued on January 30, 1957, by the Secretary of the Treasury, the director of the Bureau of the Budget and the comptroller general. It is intended that future reports be issued on a fiscal-year basis.

The report is prepared in two parts. The material in Part I was prepared by the staff of the General Accounting Office, Treasury Department, and Bureau of the Budget. It covers developments and progress having government-wide application and significance.

The material in Part II was prepared by the staff of the individual operating agencies. It is an illustrative summary of progress made in each of the individual agencies toward the objectives of the Joint Program.

This program was initiated shortly after the close of World War II as a government-wide co-operative effort under the joint leadership of the comptroller general, the Secretary of the Treasury, and the director of the Bureau of the Budget. Its purpose is to give the executive branch better information for management purposes, the Congress better information for acting upon appropriations and other legislation, and the public a clearer picture of the financial condition and operations of the federal government and, at the same time, to reduce nonessential paperwork. The concepts and objectives of the program were enacted into law in the Budget and Accounting Procedures Act of 1950 and other related legislation of 1949 and 1950.

ELECTRONIC DATA-PROCESSING SYSTEMS

Electronic data-processing systems have been installed in several agencies for use in their financial management operations.

The Treasury Department has installed an electronic data-processing machine for handling the payment and reconciliation of an annual volume of 350 million Treasury checks. The first phase of the installation was put into operation in August 1956. The installation is expected to be completed by July 1957. The Treasury is also studying the possibility of applying electronic data-processing techniques to the issuance, servicing, and retirement of savings bonds. A committee is studying the proposals submitted by four manufacturers of electronic computers.

The Bureau of Old-Age and Survivors Insurance has installed an electronic data-processing machine and related equipment for the maintenance of 100 million earnings accounts on magnetic tape. The Federal Bureau of Investigation processes its payrolls on an electronic computer.

The Department of Defense has installed several electronic data-processing systems and is installing others to handle its inventory and logistics activities in the Aviation Supply Office of the Navy Department, the Air Materiel Command of the Air Force, and

the Signal Corps and Bureau of Ordnance of the Army. In some Defense Department activities, programs are being studied for the application of electronic equipment to the entire accounting process including payrolls, inventories, costs, billing, and general accounting.

The Department of Defense has established a Data Systems Policy Council, composed of senior policy representatives from each of the military departments and the offices of the assistant secretaries of defense concerned, to develop common defense policies and joint programs. It will give first attention to policies concerning the improvement of business systems through data-processing devices, the selection of equipment, and the personnel aspects of electronic-computer installations. A Data Systems Research Staff has been established in the Office of the Assistant Secretary of Defense (Comptroller) to provide the necessary research assistance to the Policy Council and the assistant secretaries of defense.

The Post Office Department is developing plans to convert its mechanized Postal Money Order System to an electronic system. The Department of Agriculture is studying the application of electronic processes to its price-support-program operations, the Department of Interior to its Geological Survey accounting processes, and the Tennessee Valley Authority to its inventory accounting.

SCIENTIFIC SAMPLING

A sampling section has been established in the Post Office Department with responsibilities for developing scientific sampling procedures relating to all phases of postal operations. It has revised some of the existing sampling procedures and extended the sampling technique to other areas.

BONDING OF FEDERAL EMPLOYEES

Public Law 323, approved August 9, 1955, authorized government agencies to procure blanket or schedule bonds covering employees required by law or administrative regulations to be bonded and to pay the premiums from government funds. Prior to this act, individual bonds were generally obtained and paid for by the bonded employees.

Under the new bonding arrangements the penal amount of

bonds indemnifying the government has been increased from about $2 billion at a premium cost to the employees of $1,700,000 a year under the former system to about $3.3 billion at a premium cost to the government of about $300,000 a year under the present system. The premium cost to the government is more than offset by a reduction in its administrative costs of maintaining records on the individual surety bonds from about $500,000 to $75,000 a year.

ADVANCE DECISIONS AND CONTRACTS

The comptroller general is required by law to render advance decisions to disbursing or certifying officers, provided they have vouchers before them for payment or certification, and to the heads of executive agencies who have questions involving payments to be made (31 U.S.C. 74 and 5 U.S.C. 150j). Only in exceptional cases has the General Accounting Office rendered advance decisions when a payment is not involved.

The need for legal decisions on contracts prior to making awards has become increasingly apparent. In a letter to the Secretary of the Navy (B-130302, January 17, 1957), the comptroller general stated that, with a view of expediting and facilitating the orderly functioning of government procurement processes, submissions by contracting officers and heads of procuring activities may be made of any question affecting the award of a public contract when the prompt resolution of such question is necessary or desirable as a prerequisite to the making of an award. Immediate attention is to be given to these submissions to permit awards within the time limits of the bid invitations or the exigencies of the government's needs.

ACCOUNTING FOR NUCLEAR POWER REACTORS

The Atomic Energy Commission is studying the accounting problems and developing a standard accounting basis to reflect the operating economics of nuclear electric generating plants. The commission is working with the Federal Power Commission, the Accounting Committee of the National Association of Railroad and Utility Commissioners, and representatives of the utilities involved.

VERTICAL INTERNAL AUDITS

During the past two years the Army Audit Agency has developed the "vertical" approach in its internal audits. This entails selecting for an audit a representative number of installations which contribute to the accomplishment of a funded commodity program or a command within a technical service or other staff agency of the Army. By auditing these installations and the technical service headquarters simultaneously, all financial aspects of the entire program or command are covered and a more meaningful over-all operational audit report can be prepared.

COMMERCIAL-INDUSTRIAL ACTIVITIES

Bureau of the Budget *Bulletin* No. 55-4 of January 15, 1955, established policy and initiated a review of commercial-industrial-type activities conducted by the government that provide services or products for its own use which can be procured from private enterprise through ordinary business channels. *Bulletin* No. 57-7, February 7, 1957, gives further instructions to the heads of the executive departments and agencies with respect to the evaluation of commercial activities classified as services, the termination of commercial activities, and the starting of new commercial activities:

> It is the general policy of the administration that the Federal Government will not start or carry on any commercial activity to provide a service or product for its own use if such product or service can be procured from private enterprise through ordinary business channels. Exceptions to this policy shall be made by the head of an agency only where it is clearly demonstrated in each case that it is not in the public interest to procure such product or service from private enterprise.

Each executive agency was required by *Bulletin* No. 57-7 to submit to the Bureau of the Budget an evaluation report on each of its commercial activities classified as services and on each new activity approved for starting since the inventory report was made under *Bulletin* No. 55-4.

SELF-SERVICE SUPPLY CENTERS

The Department of the Army has developed a Self-Service Supply Center system for distribution of expendable supplies, similar

in concept and operation to a commercial supermarket. Pilot installations were placed in operation on a test basis early in 1956. Such centers are now being installed in many of the continental United States installations. A manual of operations for these centers, published on July 1, 1956, includes accounting procedures.

BILLING FOR PRINTING

The United States Government Printing Office has adopted a new billing procedure which provides that certain printing and binding work will be billed to the government agencies on the basis of the estimated cost, where such cost does not vary more than 5 per cent from the job order summary cost. This eliminates detailed computing work previously necessary in billing for the actual cost.

USE OF IMPREST FUNDS

Joint regulations issued by the General Services Administration, Treasury Department, and General Accounting Office in 1952 provided for the establishment of imprest funds in the executive agencies for making small purchases, usually of fifty dollars or less. The 1956 figures show 1,600 imprest-fund cashiers in the civilian agencies and 1,863 in the Department of Defense.

REIMBURSABLE PAYMENTS FROM APPROPRIATIONS

The State Department has obtained legislative authority to pay certain expenses from one appropriation with subsequent charge to and reimbursement by the several appropriations chargeable for the costs. This authority has reduced the financial work load of the State Department and several agencies to which funds are allocated.

TRANSFER POSTING ON CHECKS

The Treasury Department has installed in all of its regional disbursing offices in the continental United States a thermal method of check preparation for certain salary and tax-refund checks. This process involves the transfer posting of the payee's name and the amount to the check from a list prepared by the agency for which the disbursements are made.

PAYROLL PROCEDURES

The Post Office Department has transferred the function of issuing the biweekly paychecks to the 525,000 employees of the postal field service from approximately 38,000 post offices to fifteen regional controller offices. The payrolls are computed and prepared on electrical tabulating equipment.

FORMS CONTROL

Since January 1953, the Forms Control Program of the Post Office Department has resulted in the elimination of 1,685 forms and in the simplification and reduced use of others. Some 8,000 other forms used in the major post offices will soon be replaced by 119 existing and 55 newly designed standard forms. One of the forms eliminated, the old money-order application form, was printed in quantities of about 500 million annually.

H. Edward Breen

Current Books and Articles

BOOKS AND PAMPHLETS

American Institute of Accountants. *Survey of Consolidated Financial Statement Practice.* New York: American Institute of Accountants, 1956. 31 pp. $1.00.

The survey shows the actual practices followed by a group of American industrial corporations in the preparation of their consolidated financial statements, without specific recommendations.

American Institute of Accountants, Committee on Accounting Procedure. *Business Combinations. (Accounting Research Bulletin* No. 48, January 1957.) 7 pp. $.25.

This bulletin supersedes Chapter 7 (c) of *Accounting Research Bulletin* No. 43. The bulletin distinguishes between the two types of combinations—the *purchase* and the *pooling of interests.*

National Association of Cost Accountants. *Accounting for Returnable Containers. (N.A.C.A. Accounting Report No. 4,* January 1957.) 31 pp. $.50.

This booklet gives a summary of practice in accounting for returnable containers, including vendors' procedures, customers' procedures, and other ownership relationships.

Vance, Lawrence L., and John Neter. *Statistical Sampling for Auditors and Accountants.* New York: John Wiley and Sons, Inc., 1956. 310 pp. $9.00.

The authors discuss and illustrate the application of statistical sampling techniques to auditing.

ARTICLES

American Institute of Accountants. "An Accountant in an Accountant's Job," *The Journal of Accountancy,* 103 (February 1957), 8.

This article includes a brief description of the function of the comptroller general of the United States General Accounting Office and a brief biographical sketch of the present incumbent, the Honorable Joseph Campbell, C.P.A.

Eberhart, W. R. "Group Costing of Products to Simplify Operating Control," *N.A.C.A. Bulletin,* 38 (February 1957), 792–798.

Using inventory control and cost performance reporting as a background, the author describes a method of product grouping and development of cost element ratios to each other and to list prices as a common denominator. "The usefulness of this method in simplifying the accounting and reporting, without introducing significant error, is described."

Emery, J. M., and W. B. Walker. "Administration of the Controller's Organization," *N.A.C.A. Bulletin,* 38 (March 1957), 853–862.

The authors develop the thesis that the well-organized controller's organization provides, largely through an effective conference schedule, consultive services to management throughout the company. The article describes a system where the work and reports are carefully scheduled and over-all operation of the controller's organization is governed by a prepared manual.

Holmes, Robert W. "Managing Management Accounting," *N.A.C.A. Bulletin,* 38 (January 1957), 657–662.

This short article describes a full-fledged, accounting organization, including financial analysis, systems work, costing, general accounting, office and office equipment management, and other functions, with descriptions of suggested duties of staff units.

Hunsberger, Harold G. "What Integrated Data Processing Aims At," *N.A.C.A. Bulletin,* 38 (February 1957), 733–739.

This article, of particular interest to those who have read a good deal in electronic data-processing applications to date, deals with the benefits to be obtained from installations if undertaken in a practical manner. "The distinction between integration of data processing as

a concept and of electronic equipment as an advanced method of application is maintained."

Levy, Saul. "Internal Control and Legal Responsibility," *The Journal of Accountancy,* 103 (February 1957), 29–33.

Mr. Levy has written a brief article dealing with the accountant's legal responsibility in relation to internal control. The legal responsibility of the accountant should be limited to examination of those controls which are directly related to the accounting records.

Noyes, Charles E. "Governmental Accounting," *The Journal of Accountancy,* 103 (February 1957), 35–40.

Joseph Campbell, comptroller general of the United States General Accounting Office, discusses the functions of the General Accounting Office, the objectives of government accounting, accounting legislation, and other problems, in an interview with the editor of *The Journal of Accountancy.* He also discusses the professional approach to federal accounting and auditing.

Pinkerton, Paul W. "Helping to Put Electronic Equipment to Work for Business," *N.A.C.A. Bulletin,* 38 (January 1957), 626–634.

Mr. Pinkerton is concerned "that accountants shall think and act in the field of electronics from a broad viewpoint and shall take leadership in encouraging all uses of such equipment which will be of advantage to the company, whether these are accounting applications, accounting related applications, or other important processing of data." In the latter portions of the article, data areas regarded as capable of integrated processing are charted and described.

Triouleyre, Maurice D. "Better Control of Supplies—With Economy," *N.A.C.A. Bulletin,* 38 (January 1957), 647–656.

This article presents the results of a comprehensive study and the development of an improved stores supply system.

Wellington, C. Oliver. "Events Subsequent to the Date of Financial Statements," *The Journal of Accountancy,* 103 (February 1957), 48–53.

Statement on Auditing Procedure No. 25 issued by the Committee on Auditing Procedure in October 1954 is challenged by the author and is answered by the two former chairmen of the committee.

Executive Committee of the Federal Government Accountants Association

President: Robert W. King, Housing and Home Finance Agency, Washington, D.C.

Vice-President: Henry A. Wallace, Air Force Auditor General, Los Angeles

Vice-President: Col. Walter R. Jeffrey, Army Audit Agency, Chicago

Vice-President: William A. Newman, Jr., General Accounting Office, Washington, D.C.

Executive Secretary-Treasurer: Martin C. Powers, Washington, D.C.

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Chapter	*Representative*	*Agency*
Atlanta	J. M. Merrell, Jr.	General Services Administration
Boston	Bernard F. Smith	Navy Contract Audit Division
Canal Zone	Major A. A. Tisone	Caribbean Air Command
Chicago	Myer R. Wolfson	General Accounting Office
Cincinnati	John S. Bartlett	Post Office Department
Cleveland	Maurice J. Sater	Treasury Department
Dallas	Appointment pending	
Dayton	Raymond Tannenbaum	Air Force Auditor General
Denver	John B. Cummins, Jr.	General Accounting Office
Detroit	Sidney C. Solomon	Air Force Auditor General
Kansas City	Arthur H. Wieda	Army Audit Agency
Los Angeles	Harold L. Ryder	General Accounting Office
Minneapolis-St. Paul	Orlaf B. Hylle	General Accounting Office
New Orleans	Robert J. S. LaPorte	General Accounting Office
New York	Sidney Wolf	General Services Administration
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San Francisco	Emmett S. Clifford	Maritime Administration
Tokyo	Elton L. Bennett	Army Audit Agency
Washington, D.C.	John C. Cooper, Jr.	Department of Agriculture

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